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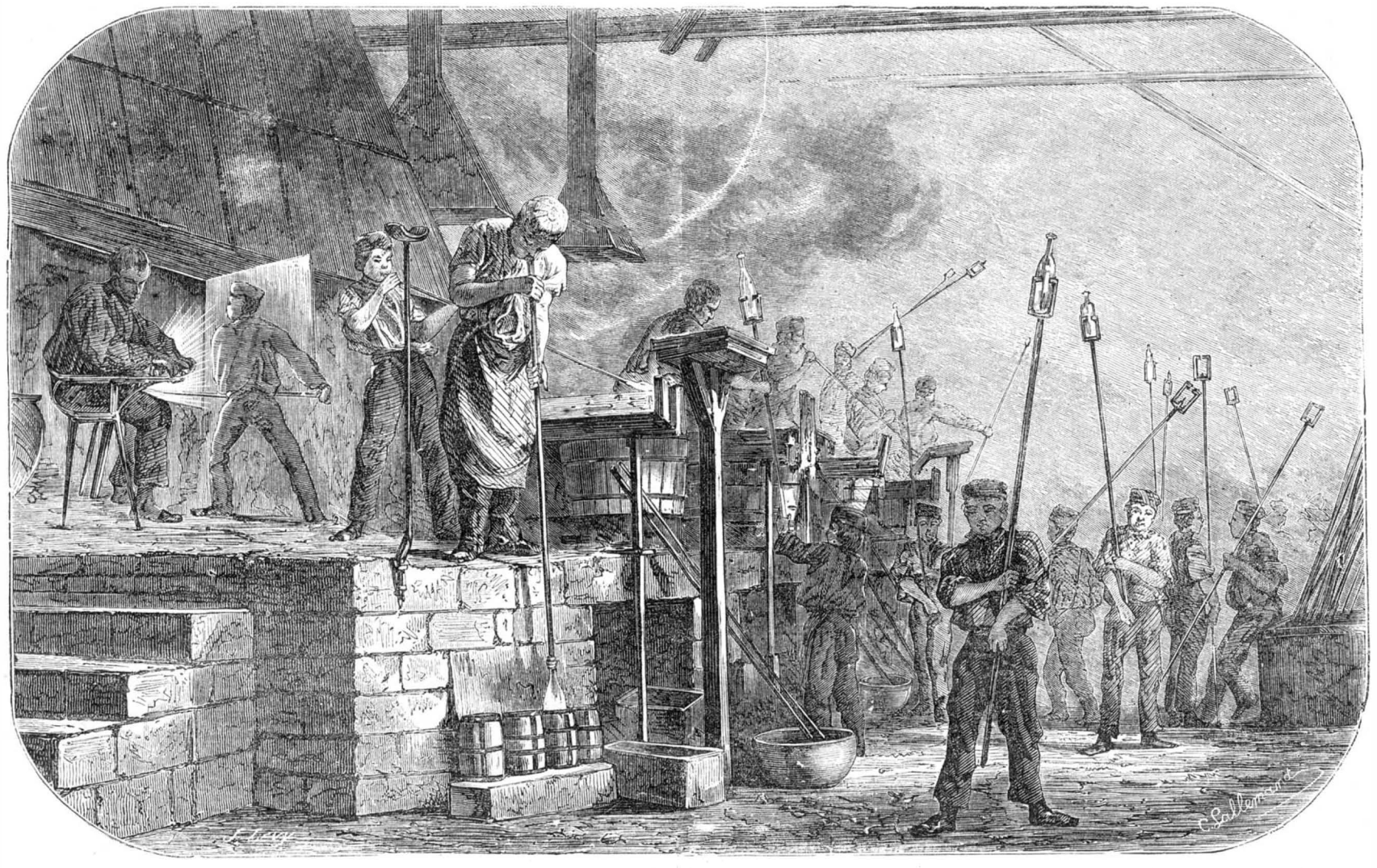


MANUFACTURE OF GLASS BOTTLES.

The Glass Works of the Departments of the Loire and the Rhone, France.

For several years the various glass works of the two Departments of the Loire and the Rhone have been united in one company, under the management of Mr. Charles Raabe, who has introduced several improvements in the manufacture. The manufacture may be divided into three classes, viz., first, that of glass bottles; second, colored sheet glass; third, sundry glass ware.

THE MANUFACTURE OF BOTTLES.

This branch can be divided into five departments: the preparation of the crucibles, the setting of the furnaces, the manner of heating, the composition of the charge, and the manufacture proper.

The preparation of the crucibles demands the greatest care, and thus far no mechanical method has been able to replace their being manufactured by hand. They are made of fire-clay and the remains of old crucibles, freed from adhering vitreous particles. When properly dried and heated they will last from twenty-five to thirty days. The crucibles must necessarily resist the pressure and the chemical action of the molten mass in the furnace, and must also bear moving and withdrawal. To a certain extent the company owes its success to the careful manufacture of the crucibles.

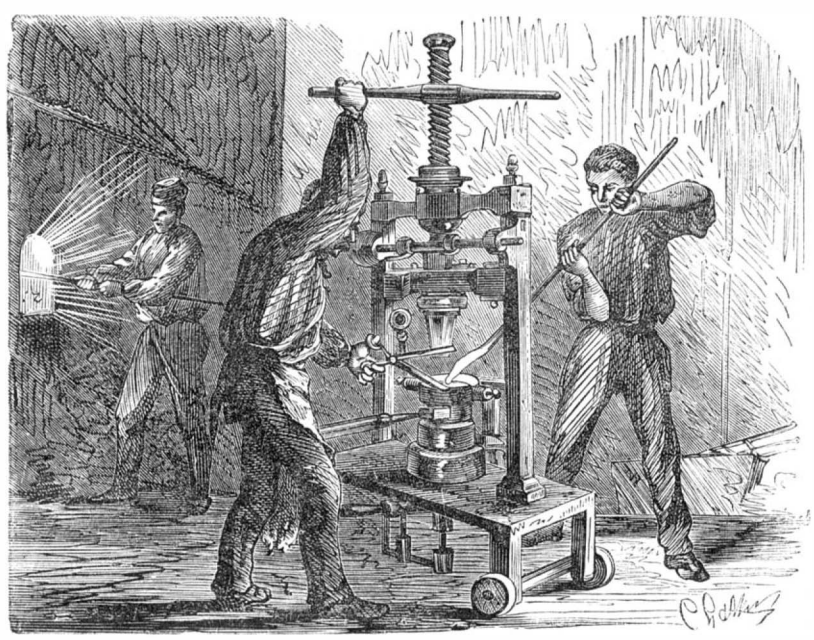
The charges for the production of glass are composed of three principal substances; sand, carbonate of lime, and marine salt. The charges containing iron yield black glass; those that are free from iron yield clear glass. A mixture of the two produces the quality used for the manufacture of champagne bottles.

The manufacture proper is divided into four periods or terms; the charge, the melting, the cooling, and the manipulation.

When the mixture or frit is withdrawn from the vaults of the furnace, it is poured into crucibles, which are filled to the rim. This operation lasts from twenty to twenty-five minutes. The melting occupies from twelve to thirteen hours, during which time the temperature is kept at a red heat. In three hours' time the mixture attains a complete state of fusion. Its volume becomes considerably reduced, and then the charging is finished. Two hours previous to the termination of the melting the crucibles are filled up with calx or refuse glass.

The melting is so well managed in respect to fuel, the men are so well instructed, and the quality of coal so well selected for the furnaces, that every available economy is realized.

The so-called cooling is the time of about one hour and a half that follows the melting, during which the temperature is allowed to fall, the mixture is in a state of repose, and the fused materials arrange themselves according to their order of density, the glass becomes homogeneous, and fines down.



PRESS FOR MOLDING GOBLETS.

GOBLET MAKERS.

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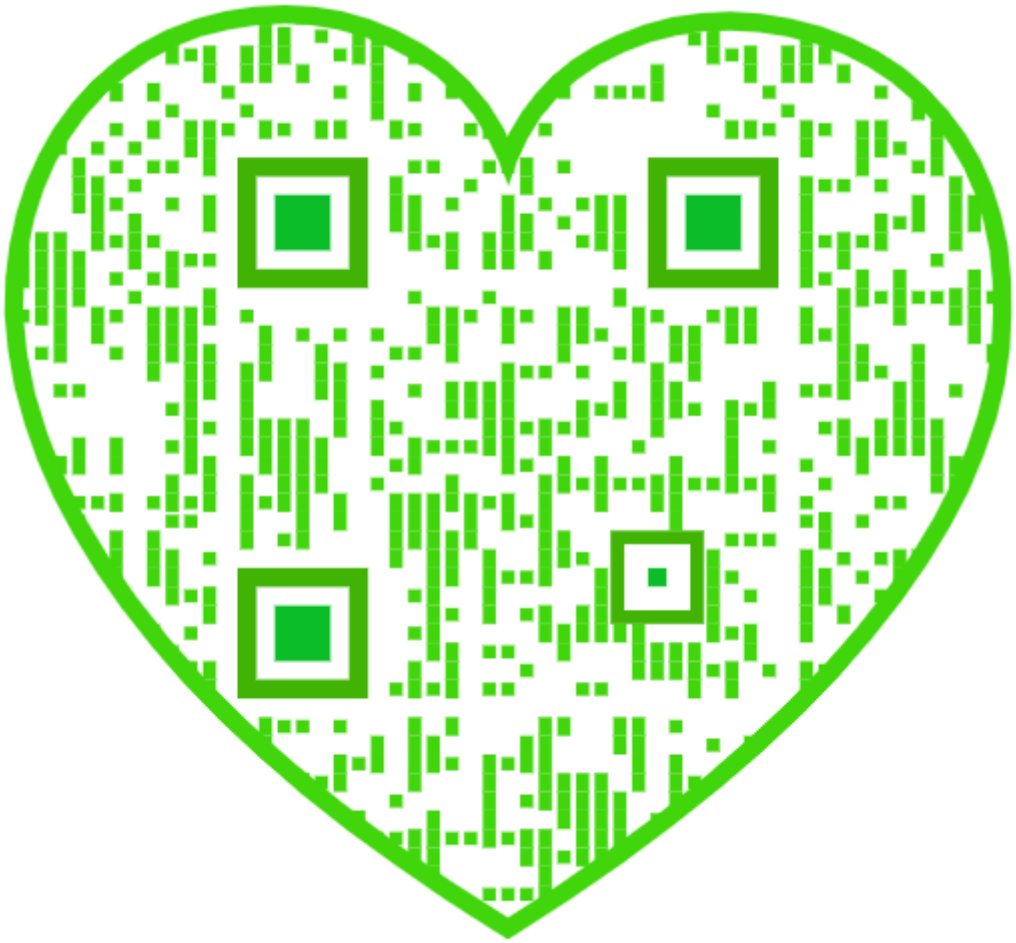
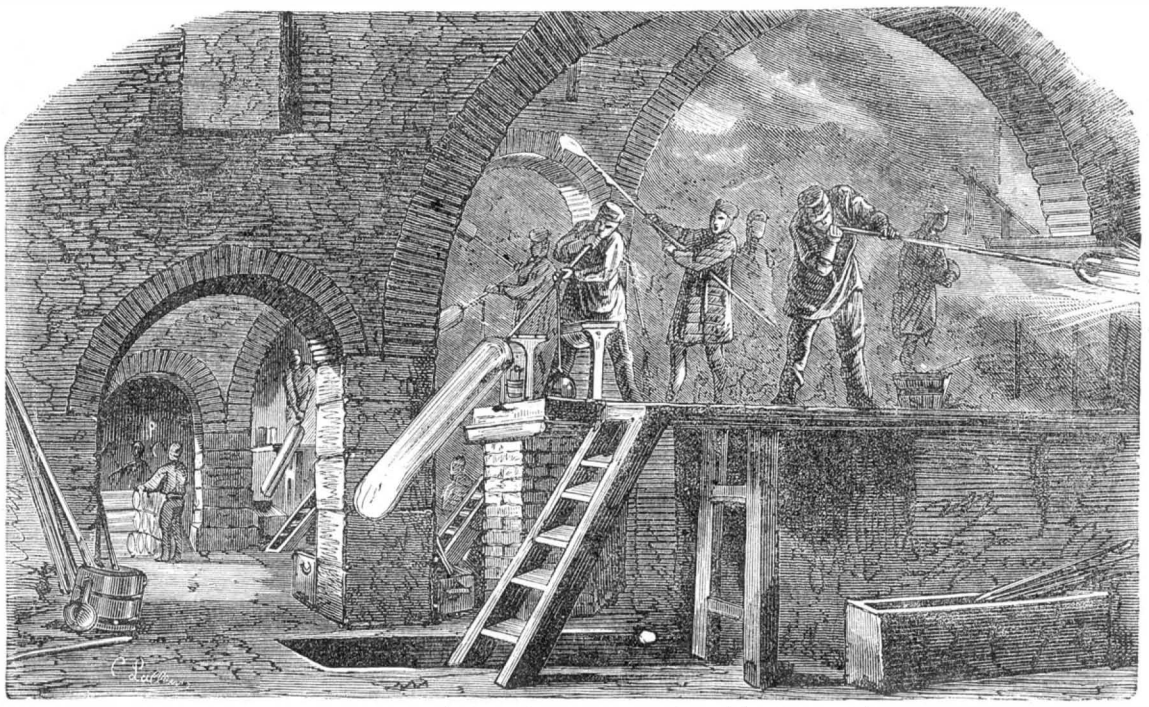


The scum is then removed from the surface. The last part of the manufacture is the manipulation, which lasts from eight to ten hours, and during which time the temperature is kept at a red heat, and the glass preserves a suitable consistency. To every crucible there is allowed sufficient room for three men—a blower, a lad, and a boy. The boy dips the glass, the lad finishes it, blows, and prepares the neck; the workman then blows the bottle, by introducing it into a mold (as shown in the large engraving), detaches it from his rod on to a table, and takes hold of the bottom with a pair of tongs. The ring around the top is then formed by presenting the neck of the bottle to the mouth of the furnace and running a string of melted glass round the extremity. The neck of the bottle is then placed a second time within the mouth of the furnace, and finished off by means of a pair of nippers. The finished bottles are handed to boys who carry them on the ends of rods to the baking furnaces, where they remain from twelve to thirteen hours exposed to a temperature of from 200° to 100°. All these operations offer many inconveniences to the workman, who is thereby exposed to a great heat, and is obliged to place the ring on the neck of the bottle while in contact with the flame. In order to ease the workmen of the company, Mr. Raabe, studied a series of improvements for which he took out patents in 1861. These improvements diminish the duration of the work, and avoid its dangers. In principle, the object is to completely suppress the thread of glass around the neck. The neck of the bottle is re-heated at a supplementary opening, then forced into a mold, and, by a slight rotary motion, assumes the form of the ring. Till then this result could not be obtained, owing to the hardness of the bottles. The advantages gained by this improvement are: the eyes are not strained, the ring is necessarily regular and neat, the mouth of the bottle is regular and smooth, and the cork more completely fits the interior cylindrical surface, the operation is more rapid, and yields six hundred and fifty bottles per man per day, instead of six hundred. Mr. Raabe has, therefore, gained rapidity, economy, safety, and the protection of the health of the workmen. Bottles of all the company's molds are disposed throughout the whole of France, at Strasburg, Paris, Nantes, Bordeaux, and Marseilles, large stocks being kept in the two latter cities. The samples exhibited at the London Exhibition, were marvels of production. The chief feature of the bottles manufactured by the company is in the poise of the neck on the body of the bottle, the softness and rotundity of the mouth and in the finish of the rim. Form and solidity are the two results gained. Some experiments made a few years back, by the Society of Encouragement, of Paris, in reference to their power of resistance, gave results that could not be obtained by any other manufactory in France or abroad. Since then progress has been made, and the use of the bottles manufactured by the company, has acquired a considerable development in the south, in the districts of Jura and Bourgoyne, for the sparkling wines made there. Even Champagne, the mother country of all effervescent wines, has commenced to draw her supplies of bottles from this company, which, notwithstanding some disadvantages, enters into competition with the old manufacturers of that locality. The following table of bottles manufactured, will illustrate the success obtained:

1853–4, 17,101,000; 1856–7, 19,583,000; 1858–9, 21,833,000; 1860–1, 23,581,000.



MANUFACTURE OF COLORED SHEET GLASS.

THE MANUFACTURE OF COLORED GLASS.

The great point in the manufacture of colored glass is the composition which here plays the chief part and decides its success. There are two kinds of colored glass—that colored in mass, and lined or covered glass. In the glass colored in bulk, the color must be uniform throughout the whole, imparting the desired hue without destroying the transparency. This, however, is not the most difficult part of the work. When glass is covered, it is necessary that the two surfaces be very perfect and that they coincide thoroughly and adhere solidly. The thickness of the colored layer must be regular, and the two glasses must not be contrary in the sense of contraction. The company had such perfect success in fixing these conditions that it may well be asserted that no covered glass can be compared to their manufacture. The compositions are infinite in their variety, and many are kept secret. The following is the composition of common sheet glass: Fontainebleau sand, 100; sulphate of soda, 36 to 40; carbonate of lime, 40; ground charcoal, 4 to 5; peroxide of manganese, 2 to 3 parts. Red glass is composed of Fontainebleau sand, 100; alkali, 18; oxide of tin, 20; oxide of copper, 15; oxide of iron, 10 parts. Oxides of chrome, cobalt, and manganese are also used for other colors, and lampblack for yellow. The lining of glass with chrome green has not been attained, but recent experiments give hopes of success. The fixing of red glass on yellow has been successfully achieved in the workshops of this company, and forms quite a new feature.

The manufacture of glass cylinders is preceded by a special operation, namely, that of preparing the enamel, which is too well known to require any description. The four periods of manufacture, previously alluded to in that of bottles, is here again brought into practice: the charge, the melting, the cooling, and the manipulation. The melting takes sixteen hours, during which time—the same as for bottle glass—the crucibles are filled up as the contents diminish. For certain colors, such as rose, violet, and yellow, the duration is limited to twelve or thirteen hours.

The cooling takes two hours, and after the skimming has been effected, the manipulation commences, which lasts from fifteen to sixteen hours, the temperature being a clear red heat. That work, represented in one of the small engravings, requires but one man, but one of the most adept. An assistant dips one dipper full of colored glass and places it on the end of the blowing rod, and passes it to the blower, who puts on three dips of white glass, blowing the muff in the same manner as for window or sheet glass. The enamel being well prepared, spreads with the white glass during the blowing and the stretching of the muff, and forms a uniform covering on the inside. After the longitudinal extension of the cylinders comes the stretching. The stretching of colored glass has only the peculiar feature that the workman uses the wooden polisher to stretch the sheet on the iron table, instead of the iron one, which would spot the colors. When the stretching is finished the sheets are left to cool for seven or eight hours. The sheets are about 32 inches by 24 inches, but much larger can be made. Since the exhibition of 1855, America and England have taken large quantities of colored glass. Glass, either covered or colored in bulk, is used for painting, etching, railroad signals, lighthouses, general ornaments, etc., but lined glass is especially used for etching or engraving.

In white sheet glass the south cannot well compete with the north of France, in respect to whiteness, owing to the primary materials. The manufacture is conducted in the same manner as in colored glass.

The manufacture of goblets or glasses is of excellent quality, and varied among the products of the glass works of the Loire and the Rhone. Here, however, and especially for chemical use, the color is faulty, notwithstanding numerous experiments to render the crystal pure and white. It was finally resolved to construct furnaces on the Belgian system, that is, of a circular shape, with a large grating in the center, charged from two openings in the furnaces. Two flues, placed between two consecutive crucibles, draw the air into the vertical flues which run along the top into the large chimney which stands some twelve feet higher than the roof. In this manner, with stronger draft and a more intense heat, the pots can be left uncovered, thereby avoiding the fumes, and yielding a very white glass, from Fontainebleau sand and lime from the Rhone.

The appreciation of the Jury of the great Exhibition of London, was based more upon the qualities adapted to general consumption and the low prices, than otherwise, and these conditions were amply fulfilled by the company. The number of furnaces in use is thirty, twenty of which are at Rive-de-Gier, nine at Givors, and one at Vienne. Twenty-two are used for the manufacture of bottles, three for white sheet glass, two for colored sheet glass, two for the manufacture of drinking glasses, and one for common glassware. The company holds the first place among the manufactories of France, and employs in all some two thousand men, women, and children.

What English Workingmen Think of Free Trade.

We learn from the *Ironmonger*, that a well attended meeting, convened by "the Trades of Great Britain Defense Association"—a body which, it was stated, was inaugurated by the masters and journeymen lathrenders of London at a meeting in May last—was recently held at the Shoreditch Town Hall, "to take into consideration the present critical state of the country, the depression of trade, and the general want of employment, consequent on the importation of foreign manufactured goods, and to petition Parliament for a commission of inquiry as to the working of our commercial policy." The following resolution was moved by Mr. S. Bartlett: "That the principle of free trade should be based upon an equality of international exchanges; but, other nations not having adopted the principle, it has become injurious to England, and is the cause of the present depression of trade, the want of employment and the increase of pauperism. This meeting, therefore, considers it their duty to the Government to institute an immediate inquiry into the working of our commercial policy, with the view of ascertaining how far this unreciprocated free trade contributes towards producing this depression, want of employment, and pauperism, and to what extent it may be limited so as to produce an effectual remedy." The mover said the subject of the meeting was not to protest against free trade *per se*, but against the manner in which the policy inaugurated by the Manchester school of economists had affected the manufacturing and industrial interests of the country. The free trade policy of England was not reciprocated by other countries, and no more striking proof of this could be found than the fact that, according to the Board of Trade returns, the imports of this country exceeded the exports in value by £67,000,000. Mr. Cobden and his co-laborers promised the workingmen increased wages and a reduction in the cost of provisions, but what was the result? Industry after industry was being annihilated, and emigration was the only panacea suggested. There was a grevious error at the bottom of this state of things, and he hoped the working classes would unite as one man in the request to the Government to inquire how far our so-called free-trade policy had produced the present depression in trade, and the consequent pauperism and want of employment. Mr. Sangster, in seconding the resolution, asserted that we lost immensely by the French treaty, which he said was of a protectionist character, and ignored the free trade principle as far as England was concerned, and if it was not put an end to would cause the ruin of English commerce and industry. English exports were heavily taxed by every nation, and it was time that something should be done to insure fair play, else foreign manufacturers would inundate our market, and the representatives of our manufactures would become the hewers of wood and drawers of waters of Europe. Mr. Brooks, in an animated speech, attributed the increase of pauperism and its accompanying ills to our commercial policy, and denounced the notion that nothing but emigration could improve the condition of the working population. The resolution was unanimously adopted; and a petition to Parliament, embodying the views of the speakers having been adopted, the proceedings terminated.

Dust.

The atmosphere teems with dust—more, of course, in towns and cities than in the country. There are three great and never-ending sources of dust. One is the beating about of woven fabrics, such as the sweeping of carpets, brushing clothing, and making beds. The next is the wear of the roads by horses, vehicles, and pedestrians. The third is the burning of fuel. There are also other sources of dust too numerous to particularize. Nothing but air-tight vessels will exclude dust. It is pumped in and out of every watch, every bookcase, jewel-box, or casket, every cupboard, every writing-desk, immediately there is the slightest change of temperature of the surrounding air. The expansion or contraction of the air causes it to pass in and out of the most minute fissure. A glass-covered engraving will quickly show whether it is perfectly lined to exclude dust; if it is not so, at the point where the air passes in and out under the glass there will the print exhibit a pointed brown dust discoloration. This is the kind of dust which we see in cities and towns. But dust has other aspects, from the dust storms of Egypt and Australia, to the particular dust made during hay-making time, the thrashing of corn, and the grinding of grain. Starchy granules are at all times to be found in the air. Again, the atmosphere is loaded with seeds. No sooner is a new railway bank thrown up of the purest virgin gravel, than in a few weeks it is covered with verdure. The great purifier of the air from dust is rain; the air is thoroughly washed by rain, and the dust therein for a time is removed. It is the excessive dust in the air, though not visible, which in dry seasons is the cause of many diseases.—*S. Piesse*.

THE London *Spectator* says the English mechanic gains little or nothing by emigration, except the chance of a good gratis education for his children. The unskilled laborer gains, in addition, a great increase of wages, of comfort, and of liberty; while the agricultural laborer may be said to gain everything.

There has been a Providence caring for mankind millions of years before the first man stood erect in this creation. The first coal-making plant that waved in the breeze was prophetic of the coming man.

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WHAT IS FOUND IN THE AIR.

From the Scientific Review.

Quite as much might be written upon the composition of the air we breathe as upon that of the water we drink. But it happens that muddy water is more visible than dirty air, and generally attracts more attention, though in reality foul air is far more injurious to man than foul water, for the latter comes first of all in contact with the digestive organs, which have the power of repelling, to a certain extent, any noxious or poisonous ingredient, whilst impure air is, on the contrary, intimately mixed up with the blood at every inspiration, and introduced at once into the system by thousands of minute blood vessels.

The refined chemical processes that have been brought to bear upon the analysis of water, and have proved so useful in a sanitary point of view, have been no less successful with regard to the atmosphere. By washing or filtering large volumes of air, we find, besides the gases oxygen, nitrogen, and a considerable amount of organic matter, germs and spores of fungi, certain acids, ozone, nitric acid, ammonia, and several other substances may be detected in greater or less quantities, according to the localities, the season of the year, the direction of the wind, the proximity of the sea, etc. Arago and De Fonvielle have written upon the sulphur which lightning finds in air and deposits upon the objects which it strikes; Baron Liebig and Lassaigne have found nitrates and ammonia in the air, which are washed down by thunder storms. Professor Barral has noticed that phosphate of lime is likewise present to a certain extent in the atmosphere, and Dr. Phipson, in its curious little work on meteors, describes an experiment in which a sheet of glass covered with glycerin, and exposed to the wind after the great fall of shooting stars in November, 1866, collected certain black corpsucles, which, on being treated with hydrochloric acid, gave yellow chloride of iron, and were, probably, some of the substance of shooting stars.

The passing of the alkali act of 1863, which compels manufacturers to consume 95 per cent of the hydrochloric gas evolved from the sulphate of soda furnaces, has gone far to purify the air of large manufacturing towns, and to protect the vegetation that exists around them, and contributes pure oxygen to their atmosphere. The reports published by Dr. Angus Smith on the operation of this Act show that its beneficial effects continue. The last report, recently issued, contains the results of some interesting observations on the air of cities, and gives some notion of the ordinary state of the atmosphere of towns.

The refinements of modern science are enabling us to grasp a class of facts hitherto unknown except by the effects which they produce. The air seems now to be undergoing an investigation similar to that which was commenced some years ago in regard to the water supply. "Horrors" hitherto unknown burst upon mankind when the microscope revealed the animal organisms which reveled in the polluted water of the Thames. More recently science has been able to detect not merely the signs of actual and present contamination, but the tokens of a previous pollution. Hence, the analytical chemist is able to give us the history as well as the character of the water we drink, and can tell whether in its course down the stream it has at any time been in contact with decomposing animal matter. The question is not merely curious, but of great sanitary value, since there is reason to believe that sewage sometimes gives to water a species of poison which remains even when the sewage itself is destroyed. Something of the same kind is now being revealed in regard to the atmosphere. By examining rain we are enabled to discover what are the gases and substances which float in the air. When there is no rain it is possible to wash the air in bottles, and so make it yield the foreign matters with which it is impregnated.

Rain varies greatly in its character according to the source from whence it proceeds, and the locality where it falls. Falling on the coast, and coming from the sea, it contains chiefly common salt, which crystallizes readily. The proportion of sulphates to chlorides is larger in rain than in sea water. This is a general rule, holding good from Central Germany to the most northern Hebrides, and, as we advance inland the rain-water sulphates increase. These sulphates are derived from the sulphureted hydrogen, which otherwise would be intolerable, and which is given off by decomposing matter. The pure oxygen of the air combines with the stinking gas, oxidizes it, and makes it harmless, so far as the gas itself is concerned

Just as the nitrates in the water supply of London are a measure of the "previous sewage contamination" of that fluid, so the sulphates washed out of the air by rain are a measure of a similar contamination affecting the atmosphere. There is, indeed, a disturbing cause in reference to air. The sulphates are largely increased in the atmosphere of towns by the combustion of coal. From the same cause, coupled with the decomposition of certain substances, there is an increase of the ammoniacal salts in the rain as towns increase. Rain may also become acid from the presence of sulphur, combined with oxygen. Towns vary in their atmosphere and their rain. Civilization not only pollutes rivers, but pollutes likewise the ærial currents. The rain of Manchester turns the blue litmus paper red, and where most soot is found there is much acidity. Sulphuric acid exists as the result of a large consumption of coal. Rain coming after a period of drought is particularly rich in acid, while continuous rain reduces the quantity.

Even where there are no alkali or glass works there is a certain amount of chlorides in the air in excess of that which the sea contributes. This is rather a puzzling circumstance; but Dr. Angus Smith offers an explanation of it. He suggests that the extra chlorides come from the burning of coal, and have their origin in the common salt of the ancient seas.

But there is much more in the air than acids and salts, and a day will come when the Registrar General will publish monthly analyses of the London air, like the present returns with regard to the water supply.

Tuns of solid impurity may doubtless be found in a month's supply of air to the metropolis. Not long ago an enthusiastic projector proposed to "lay on" fresh air from Hayes Common, in Kent, to be conveyed into metropolitan houses by means of pipes. If ever this idea becomes an accomplished fact it may be proper to analyze the air as "drawn from the company's mains." At present we have to rely on ærial reservoirs in the nature of parks and open spaces, the value of which is undoubted.

Mr. Dancer has studied the character of the solid particles contained in the air of Manchester. Samples of the air were washed by Dr. Angus Smith, and the fluid was afterwards microscopically examined by Mr. Dancer. A single drop of the water was computed to contain no less than a quarter of a million of fungoid spores. The fact was verified by examining an extremely small particle, and multiplying the result. The bottle of water having been kept for thirty-six hours, the quantity of fungi, already so great, "visibly increased," and on the third day minute creatures were observed moving about in the fluid. Keeping, however, to our former figures, we find that 150 drops of water would contain more than 37,000,000 of the fungi, these 150 drops being the washings of 2,495 liters of the air of Manchester, which is about the quantity of air passing through the lungs of a man in ten hours!

The drops of water yielded a kind of dust, which in the space of three or four days produced considerable numbers of animalculæ, in which monads were most conspicuous. In this dust were particles of partially burned wood, fragments of vegetation, filaments of cotton and granules of starch.

Dr. Angus Smith has also experimented on smoke of various degrees of blackness and brownness, and shows that the difficulty of consuming smoke does not commonly arise from a deficiency of air in the furnace, but from the fact that a rapid draft often fails to allow time for proper combustion. It is now certain that the black smoke prohibited by act of Parliament, contains carbonic oxide, one of the most poisonous of gases. Carbonic oxide is only detected in smoke by the illegal density, and when we find this black smoke is really an expensive article to produce, we seem to be furnished wtth every reason why such a nuisance should be prohibited.

But though man and his works tend constantly to render the atmosphere dirty and unfit for life, nature on the other hand tends to counterbalance the evil. The constant production of ozone and nitric acid in the air of the country, the presence of iodine and ammonia and sweet scented essences occasionally met with in our atmosphere, the evolution of oxygen by trees and shrubs, are so many beneficial influences which contribute to purify the air.

Value of Meteorological Observations.

An instrument which can accomplish the registration of sunshine and cloud would furnish information of the utmost value to agriculture, and some of the most important industrial pursuits of our country. We may illustrate what is here meant by taking one of the most valuable of our farm crops —the hay crop—as our example, though, as will be seen, the remarks apply to all other agricultural products. On a fertile soil the weight of grass that may be produced depends on two conditions—the supply of a sufficiency of rain, and the furnishing a sufficiency of sunlight in the eleven weeks between the middle of April and the last of June. The rain brings into the growing plants the inorganic materials they require from the soil, and of course, furnishes their requisite supply of water; the sunlight forms in them their various organic and nutritive material. Now last year (1868), during the period referred to, there was a copious supply of water, but, owing to prolonged cloudy weather, an insufficient supply of light—the grass was all the time growing, as it were, in the shade. When haymaking came, observing farmers remarked how much longer than they expected it took to cure the grass; that is, to get rid of its water; and how great a falling off there was in the resulting weight of hay. Nor was this all. The diminished quantity of nitrogenized material it contained caused it to be less nutritive; a greater weight of it was required to fatten cattle, or even to keep them in good condition. The effect was felt by those interested in raising animals for sale, and eventually in the quality and cost of butcher's meat.

The object of meteorological observations is to enable us to record the past and predict the future state of the weather, and that the imperfect manner in which this has hitherto been accomplished has been mainly due to the unreliable and unsatisfactory mode in which such observations have been made. When self-recording machinery, such as New York has in her Central Park, shall have been established in all our large cities, the problem of predicting the weather will undoubtedly be solved. One most important agency is, however, essential to this result—it is telegraphic communication between such various observatories. A little consideration will show how this, which is at present a vague conception floating in the popular mind, can be carried into effect. Already telegraphic companies, desirous of aiding the progress of science, send over their lines, without compensation, brief dispatches of the state of the weather and aspect of the sky. They report, for instance, that at St. Louis it is cloudy—at Charleston, the wind is at the north. They also give the hight of the thermometer. But this information is really of little use. What is wanted is a statement of *changes* in the weather, with the time of their beginning and end. Thus, if it were stated that a rain-storm began at Raleigh, North Carolina, at 2 A. M.; that a rain-storm began in Richmond, Virginia, at 11 A. M.; that the same occurrence happened at Washington at 5 P. M., and at Philadelphia at 10 P. M., the inference would be that this was in fact the same rain-storm advancing northeastwardly, and that it would reach New York at about three o'clock on the following morning. In like manner if the time of ending were given at each successive station, its time of ending at others not given might be foretold. If to this information were added the quantity of rain that had fallen in succession at each place, the condition of the storm, as to whether it was on the increase or decrease, could be indicated, and perhaps the point at which it would die out. Now what is here said by way of illustration in the case of rain, applies to wind-storms, tornadoes, periods of great heat, periods of great cold, and other atmospheric phenomena.—*J. W. Draper in Harper's Magazine for August.*

Establishment of Soap Factories.

The fabrication of soaps requiring substances of different origin, the manufacturer must prefer that locality where the crude materials which furnish the basis of the fabrication are abundant and easy to be obtained. It is thus that a manufactory of soap with olive oil for its base, will be in better condition of success in a seaport, or in its neighborhood, than in an inland city, because the oil being imported, the manufacturers of soap of the other localities would obtain those oils from second hand, with much expense, and could not compete with the manufactories of the seaports.

For the fabrication of the other kinds of soaps, such as those of tallow, greases, animal oils, oleic acid, etc., experience proves that this fabrication succeeds, in general, better in the inland cities, and particularly in the northern than in southern localities. It is then important in the establishment of a soap manufactory, to make products similar to those employed in the locality. For example: a manufacturer of oleic soap will realize fine profits in New York, Philadelphia, Cincinnati, etc., and may experience a loss in New Orleans, and other cities of the south.

As for the other conditions which have to be observed in establishing a manufactory of soap, it must, if possible, be established in a locality where the supplies are convenient, and can be obtained with little expense. It is thus we see in France, that the principal manufactories of oleic acid soaps surround the manufactories of stearic acid, which furnish them with the oleic acid; they thus save the expenses of transportation. In industry, a useful economy is one of the most essential elements of success.

In regard to the working material, it is about the same in all manufactories; however, there exist some modifications, but these modifications are only in the apparatus used to prepare the lyes. Thus, in all the manufactories where crude soda is employed to prepare the lye, to wash the soda and extract its alkali, they use vats built of masonry, or large cylindrical tanks made of sheet-iron; whilst, if salts of soda or potash are employed, their solution is effected by means of boiling water in cast-iron or sheet-iron kettles. Necessarily, these different methods of operating cause modifications in the apparatus for preparing the lyes.

There exist also some differences in the construction of the frames according to the kind of soap which is manufactured. Thus, at Marseilles, the frames in which the soap is run are always made of stone, while in other localities they are generally of wood. As for the kettles, those of Marseilles are of stone, elsewhere they are of cast iron, sheet iron, or wood. Their shape is generally the same in all manufactories; it is a truncated cone.

The manner of heating is improving every day. Heating by steam is now employed in all large factories.—*Dussauce's Treatise on the Manufacture of Soaps.*

Watering Streets with Saline Solutions.

Our readers will recollect an article on the above subject published on page 217, Vol. XIX, of the SCIENTIFIC AMERICAN, wherein it was stated that a solution of mixed chlorides of calcium and sodium had been satisfactorially used for this purpose. We now learn that this system is in full and successfull operation in Liverpool, with the cordial co-operation of the local authorities. In Liverpool it is found that 75 per cent of the work of water distribution is saved, but probably the most interesting fact elicited, is that in streets watered on this system, sweeping may be practically dispensed with. This is a result worth noting, and we hope something of the kind may be tried in this city. We have no doubt of the efficiency and cheapness of the method, the expense of the salts employed being covered by the saving in cost of sprinkling.

A Small Engine.

W. I. Trafton of Manchester, N. H., who has already made one miniature steam engine of great delicacy and beauty, is about to construct another. He is to make every part of the engine, with the boiler, from a single silver half-dollar. When done it will be placed under a glass case three-quarters of an inch in diameter and an inch and an eight in hight. The boiler will hold about 8 drops of water, but one-half that quantity will run it several minutes. It will have all the parts of an engine, and the boiler will have two minute gages. Some of the smaller parts can only be made by the aid of a powerful magnifying glass.

Senator Sprague is said to be the largest employer in the United States. He gives work to about eight thousand persons, and has recently raised their wages fifteen per cent.

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Improved Siding Hook and Combined Tool.

Our engravings exhibit the form and details of W. A. Sharp's combined joiners' tool and siding hook. The form of the tool is distinctly shown in Figs. 1 and 2.

It is made of mahogany, or other suitable wood, and covered on all sides with polished brass plates. It is twelve inches long, two and one half inches wide, and three fourths of an inch thick.

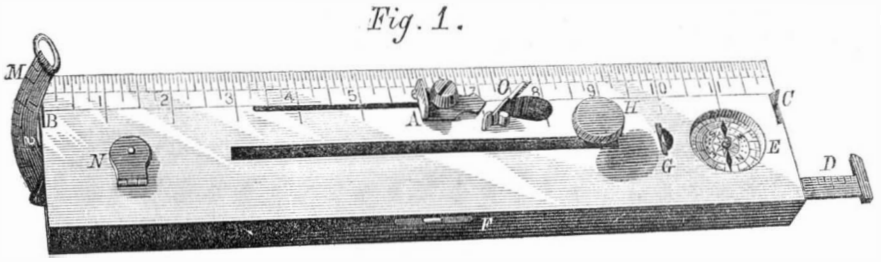
The plates on the front and back sides are graduated to form common foot rules, which are divided into eighths and sixteenths. An adjustable slide, A, Fig. 1, may be set to all widths between three and six inches from the spur, B, and by loosening the set screw which holds it, and reversing its position, it can also be set to all widths between five and eight inches from the spur, C, so that spacing may be done from one or the other spurs for all widths between three and eight inches.

The spurs, B and C, are attached to the screws that fasten the end plates, and a quarter turn of these screws throws them up, in which position they engage, by notches not shown in the engraving, with the brass surface plate and are firmly held in position; a reverse motion turns them below the surface plate out of the way. These spurs may be taken out to be sharpened by loosening the screws referred to, which releases them, and as their lower ends are slotted they may then be slid off the screws. A screw driver is attached to the end of the calliper bar, D, sliding in on the right hand side of the compass, E. On the right hand side of the tool is a spirit level, F, and on the side near the compass is a plumb level, G. The convenience of this level will be apparent to every joiner. In the same side plate is cut a second longitudinal slot in which plays a bolt, with milled thumb nut, H, carrying at the opposite end a diamond-shaped knife blade, I, Fig. 2, used to mark across the siding in weather-boarding. When not in use the knife is drawn inside of the surface plate by a spring which holds it until again required. The knife is V-shaped, which insures a smooth cutting stroke when moved in either direction. By removing the thumb nut, H, when in the position shown in the engraving, the knife may be taken from the knife block (which plays in a groove between the side surface plates), through a hole in the surface plate, Fig. 2, corresponding to a hole in the knife block, in which the shank of the knife blade is inserted.

By placing the tool on the siding at the right-hand corner boards, or casings, with the guards, J K, against the casing, the knife may be drawn down by the thumb nut, H, to mark the board or siding, and by reversing the tool the same may be done at the other corners.

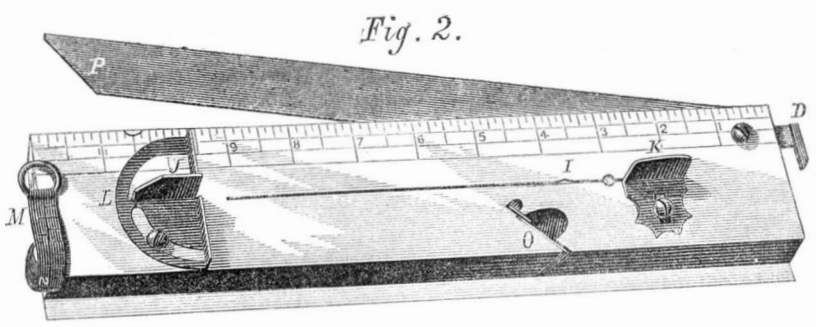
By placing the half circle plate, L, Fig. 2, on the lower edge of the siding or any studding, the siding may be marked squarely across to form a head joint. The half circle, L, is graduated, so that it may be set to a right angle with the knife slot, or to any other angle required for cutting miters, as when siding up under eaves on gables. A set screw holds it when so adjusted. The guard, K, is also adjustable laterally to correspond with the set of the half circle-plate, L.

Fig. 1.



SHARP'S COMBINATION SIDING HOOK.

Fig. 2.



M is a tape line of any desirable length, graduated on one side to feet and inches, and on the other side to links, and wound in by a crank, N, or a spring between the plates.

O is a plane for making joints when the sawing has been defective, or a rabbet plane for bench, or getting out moldings. The bit can be readily taken out and sharpened.

A try and bevel square blade, P, which may be graduated to inches, shuts into the edge of the tool, as shown in Fig. 2, with set-screw pivot, and can be opened by the thumb nail like a knife blade. By loosening the set screw it can be slid back in the slot to form a try square, in which position it is held by the set screw. This is a convenient feature in cutting the siding around moldings.

We need not specify more particularly the uses to which the different parts of this ingenious tool may be put as they will be perfectly obvious to every mechanic.

The inventor claims that it will save its cost in a very short time, in the saving of time consequent upon the use of a large number of tools liable to be misplaced on the scaffold.

The workman, attaching it to his suspender, need only take upon the staging his hammer and nails; all the other operations required may be accurately and rapidly performed by the use of this combination tool. When not in use all the parts exterior to the plate may be removed leaving only a flat surface to the tool when it is packed in the chest.

The inventor feels confident that a workman once employing this tool would be content to use no other.

Application for a patent is pending through the Scientific American Agency, by W. A. Sharp, of Tama City, Tama Co., Iowa, who may be addressed for the entire right, or for the right to manufacture on royalty.

Stewart and Tait's Experiments on the Heating of Bodies by Rotation in Vacuo.

Since the theory of a universal all-permeating elastic ether, far more subtile than any known gas, even when expanded to the utmost by mechanical means, has been found to account for the phenomena of light and heat more perfectly than any other, the actual demonstration of its existence has been a desideratum. The experiment described in the present article, although to our minds not at all satisfactory, were undertaken to prove the real existence of ether.

The experiments are those of Balfour Stewart, F.R.S., Superintendent of Kew Observatory, London, and P. G. Tait, M.A., of Edinburgh, a description of which we extract from "Professor Pepper's Cyclopædic Science."

These gentlemen, having obtained certain results in air, were encouraged to construct an apparatus wherewith to procure rotation *in vacuo*.

In this apparatus a slowly-revolving shaft is carried up through a barometer tube, having at its top the receiver which is to be exhausted. When the exhaustion has taken place, the shaft connected with the multiplying gear revolves in mercury. The train of toothed wheels causes the disk of aluminum to revolve 125 times for each revolution of the shaft. The thermo-electric pile, the most delicate thermometer or test of heat, is connected by two wires carried through two hole in the bed-plate of the receiver with a Thompson's reflecting galvanometer needle. The outside of the thermo-electric pile and its attached cone was wrapped round with wadding and cloth, so as to be entirely unaffected by currents of air.

During these experiments the disk of aluminum was rotated rapidly for half a minute, and a heating effect was, in consequence of the rotation, recorded by the thermo-electric pile.

To obviate the objection that the electric currents which take place in a revolving metallic disk might alter the zero of the galvanometer, the position of the line of light was read before the motion began, and immediately after it ceased, the difference being taken to denote the heating effect produced by rotation.

The thermometric value of the indications given by the galvanometer was found in this way: "The disk was removed from its attachment and laid upon a mercury bath of known temperature. It was then attached to its spindle again, being in this position exposed to the pile, and having a temperature higher than that of the pile by a known amount. The deflection produced by this exposure being divided by the number of degrees by which the disk was hotter than the pile, gives at once the value in terms of the galvanometric scale of the heating of the disk equal to 1° on Fahrenheit's scale.

The disk of aluminum being blackened with a coating of lampblack, applied by negative photographic varnish, and rock salt inserted in the cone, the following results were obtained.

No. of set.	No. of observations in each set.	Time at full speed.	Heat indications ° Fahrenheit.
I.	3	30	0·85
II.	4	30	0·87
III.	4	30	0·81
IV.	3	30	0·75

To ascertain whether the radiant heat recorded was derived from the rock salt, or from heated air, or from the surface of the disk, the next series of experiments were tried.

EPXERIMENTS WITH BLACKED ALUMINUM DISK WITHOUT ROCK SALT.

No. of set.	No. of observations in each set.	Time at full speed	Heat indications ° Fahrenheit.
V.	3	30	0·92
VI.	3	30	0·93

With certain modifications of the above experiments it was satisfactorily proved that the effect was not due to heating of the rock salt, or to radiation from heated air; it must therefore be due to the disk of aluminum, which seemed to have rubbed against some matter which remained in the receiver after the air was removed. The question being "Was this ether?" the experimenters further state that:

1. It may be due to the air which cannot be entirely got rid of.

2. It is possible that visible motion becomes dissipated by an etherial medium in the same manner and possibly to nearly the same extent as molecular motion, or that motion which constitutes heat.

3. Or, the effect may be due partly to air and partly to ether.

Not to leave the matter wholly undecided, it was suggested by Professors Maxwell and Graham that there is another effect of air, namely, fluid friction, the coefficient for which they believe to be independent of the tension.

It would appear, however, that the fluid friction of hydrogen is much less than that of atmospheric air, so that were the heating effect due to fluid friction it ought to be less in a hydrogen vacuum. An experiment proved that the heating effect due to rotation in a hydrogen vacuum was 22·5, while in an air vacuum it was 23·5, and the authors are inclined to consider these numbers as sensibly the same, and that the experiment indicates that the effect is not due to fluid friction; at the same time they do not suppose that their experiments have yet conclusively decided the origin of this heating effect, but they hope to elicit the opinions of those interested in the subject, which may serve to direct their future research.

These experiments are considered by Professor Pepper as more satisfactory than any previously tried, and, taken in conjunction with facts, such as the temporary phosphorescence of certain bodies by what is termed insolation or irradiation, or the action of light in reducing certain salts to their metallic state, or the elaborate and beautiful effects obtainable from thin films of solid, fluid, and gaseous bodies, or the action of crystallized bodies on polarized light, they do altogether impress the reasoning faculties with a conviction that a vibrating motion accompanies the production of all light, which can only be propagated by the communication of these vibrations or tremblings to a medium, itself as subtile, rare, and exquisite as the delicate mechanism that sets it in motion.

Waterproofing Walls.

One of the most recent of the many uses to which Mr. Frederick Ransome's process of manufacturing artificial stone has been applied is in protecting the outer walls of buildings, so as to enable them to resist the action of the weather by making them waterproof. Through well-built and substantial walls, moisture will make its way, and the ordinary type of dwelling house is very pervious to wind-driven rain. We recently noticed what Mr. Ransome is doing in preserving stone, and his system of waterproofing is only an application of the same process.

The external surfaces of the walls to be protected are first washed with a silicate of soda or solution of flint, which is applied again and again, until the bricks are saturated, and the silicate ceases to be absorbed. The strength of the solution is regulated by the character of the bricks upon which it is to be applied, a heavier mixture being used upon porous walls, and a lighter one of those of denser texture. After the silicate has become thoroughly absorbed, and none is visible upon the surface, a solution of chloride of calcium is applied, which, immediately combining with the silicate of soda, forms a perfectly insoluble compound, which completely fills up all the interstices in the brick or stone, without in any way altering its original appearance. By this operation the wall is rendered perfectly watertight, and, as the pores of the bricks are thoroughly filled for a considerable depth from the surface with the insoluble compound, which is entirely unaffected by atmospheric influences, no subsequent process is necessary.

Already Mr. Ransome has successfully applied this process to a large number of buildings, several of which were previously almost uninhabitable from the constant dampness, and a lengthened experience has proved that it is not only thoroughly effective; but, from the comparative insignificance of its original cost, and the fact that renewals are never required, the system recommends itself for general adoption in preference to all other methods of waterproofing.

The Beet-Root Sugar Crop.

A recent issue of the *Journal des Fabricants de Sucre*, says that the late heat has proved favorable to the beet harvest in Europe. Reports of the crops continue to vary according to the locality. In some districts it is generally in fine condition in others not so good; and in some places there are great complaints of the white worms, which are attacking the beet with all their destructive powers. The smaller beets, which are expected to form the greater portion of the harvest, require frequent watering, and they must have very favorable weather if they are to turn out well. The fine promises of spring have disappeared, and a good average harvest is all that can be anticipated; but it will not nearly approach the 300,000,000 kilogrammes of sugar which were looked to at the commencement of the season. The temperature which has materially improved in Germany, has produced a great change in the growth of the beet, and has quite dissipated all the fears which were entertained as to the approaching harvest. According to the later estimates taken in all sugar-producing countries in Europe, the production on the quantity of beet sown will be ten per cent more than last year.

CAMPHOR WATER.—This useful domestic medicine is thus prepared: Take a quarter of an ounce of camphor and inclose it with a glass marble in a muslin bag; put this into a wide-mouthed bottle, such a one as is used for preserved fruit. Now fill up the bottle with water that has boiled a few minutes and has been allowed to become cold. The glass marble is used to keep the camphor from floating, which it otherwise would do. After about three days the water will become saturated with the camphor, and may be poured off as required. A wineglassful is a dose. It is very useful as an antispasmodic in hysteric and nervous affections.—*S. Piesse.*

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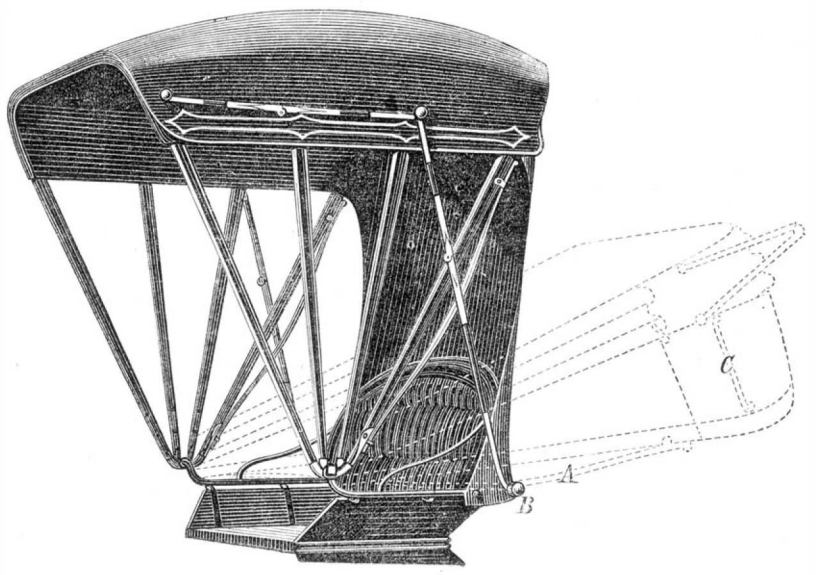
Improvement in Buggy Tops.

The simple improvement we herewith illustrate is well designed to remove an inconvenience to which we have heretofore called the attention of our readers, namely, the bumping of the rear bow in carriage tops upon the prop-blocks, and the consequent wear and sometimes breaking of that bow, and the wrinkling of the top cover when the top is thrown back. The improvement consists in placing a flat steel spring on the upright part of the rear bow, in the manner shown in the engraving, and a rigid brace of metal, to keep the rear bow and the one next it constantly separated, so that the leather of the top need not be crushed and crumpled between them. In the dotted outline the position of the parts when the top is thrown back is well shown ; A being the spring resting upon the prop-block, B, and C being the metallic brace which keeps the bows separated.

The engraving so well exhibits the nature of this improvement that further description will not be needful. This improvement is one that will commend itself to carriage builders and users. It may be applied without at all detracting from the beauty and grace of the top as ordinarily constructed, and will add greatly to its convenience and durability.

Patented through the Scientific American Patent Agency, August 24, 1869, by J. S. Wayne, whom address at Quincy, Ill.



STILLENGER'S PATENT BUGGY TOP.

To Color-Stain Dried Grass.

There are few prettier or naments, and none more economical and lasting, than bouquets of dried grasses, mingled with the various gnaphalia, or unchangeable flowers. They have but one fault ; and that is, the want of other colors besides yellow and drab or brown. To vary their shade, artificially, these flowers are sometimes dyed green. This, however, is in bad taste, and unnatural. The best effect is produced by blending rose and red tints, together with a very little pale blue, with the grasses and flowers, as they dry naturally. The best means of dyeing dried leaves, flower, and grasses, is simply to dip them into the spirituous liquid solution of the various compounds of aniline. Some of these have a beautiful rose shade ; others red, blue, orange, and purple. The depth of color can be regulated by diluting, if necessary, the original dyes with methyl or spirit down to the shade desired. When taken out of the dye they should be exposed to the air to dry off the spirit, They then require arranging, or setting into form, as, when wet, the petals and fine filaments have a tendency to cling together, which should not be. A pink saucer, as sold by most druggists at sixpence each, will supply enough rose dye for two ordinary bouquets. The druggists also supply the simple dyes of aniline of various colors, at the same cost. The pink saucer yields the best rose dye. By washing it off with water and lemon juice, the aniline dyes yield the best violet, mauve, and purple colors. —*S. Piesse.*

Coating Castings with Gold and Silver.

GILDING.—Gilding cast iron by means of gold amalgam is very difficult, as the amalgam does not stick to the iron. It is therefore necessary to brush the well-cleaned surface of the iron with a concentrated solution of copper vitriol, and to apply the amalgam to the precipitated copper. As under certain circumstances the coating of copper is injurious, Böttger coats the articles direct with mercury by means of the electro-positive zinc in the following manner: The article to be gilded is well cleaned and boiled in a porcelain vessel together with 12 parts of mercury, 1 part of zinc, 2 parts of iron vitriol, 1½ parts of muriatic acid of 1·2 specific gravity, and 12 parts of water ; in a short time a layer of mercury will deposit upon the iron, and upon this the gold amalgam may be uniformly distributed.

The gilding may also be effected upon polished iron in the following manner : If a nearly neutral solution of chloride of gold be mixed with sulphuric ether and agitated, the ether will take up the gold and float above the denser liquid. When this auriferous ether is applied by a camel hair pencil to brightly polished iron or steel, the ether evaporates and the gold adheres. It is fixed by polishing with a burnisher. This gilding is not very rich or durable ; in fact the affinity between gold and iron is feeble compared to that between gold and copper or silver.

Gilding of cast iron by the galvanic way is also difficult, and is successful only if the article is perfectly clean. It is advisable previously to coat the article with copper or silver.

Polished iron may also be gilded with heat by gold leaf.

SILVERING CAST IRON.—Iron to be silvered is first provided with a coating of copper, upon which the silver is applied either by means of amalgam or silver leaf.

Cast iron can be well silvered by the galvanic way without a previous coppering.—*Practical Treatise on Metallurgy.*

Preparation of Sizes for Gilding.

GOLD OIL-COLOR, OR SIZE.—The English method of preparing the color in size, which serves as the ground on which the gold is laid, is, to grind together some red oxide of lead with the thickest drying oil that can be procured—the older the better. To make it work freely, it is mixed, before being used, with a little oil of turpentine, till it is brought to a proper consistence.

GOLD WATER SIZE.—One pound of Armenian bole, two ounces of red lead, and a sufficient portion of black lead, are ground separately in water, and then mixed, and re-ground with nearly a spoonful of olive oil. The gold size is tempered by mixing it in parchment size which is clear and clean, and has been passed through a fine sieve to clear it of all foreign matters. The *parchment* size is made by boiling down pieces of white leather, or clippings of parchment, till they are reduced to a stiff jelly.

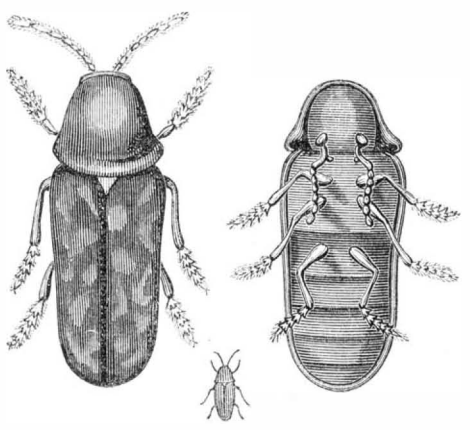
PREPARATORY SIZE.—Boil a handful of the leaves of wormwood and two or three heads of garlic in a quart of water, until the liquid is reduced to one half ; then strain it through a cloth, and add half a handful of common salt, and nearly half a pint of vinegar. The design of this composition (usually employed in gilding looking-glass and picture frames) is to obviate the greasiness of the wood, and prepare it the better to receive the coats which are to be laid on, and to preserve it from the ravages of worms. When used, it is mixed with a sufficient portion of good glue, boiling hot. In applying it to the gilding of plaster or marble, the salt must be left out of its composition ; as, in damp situations, this would produce a white saline efflorescence on the surface of the gold.

WHITE COATING.—A quart of strong parchment size and half a pint of water are to be made quite hot, and to this are to be added (in small portions from time to time) two good handfuls of common whiting passed through a fine sieve ; this mixture is to be left to infuse for half an hour, when it is to be stirred carefully so that the amalgamation may be perfect.

COLORING YELLOW.—Half a pint of parchment size is taken, which must be clean, white, and clear, and of one half the strength of that used for the white coating ; this is warmed, and there is mixed with it two ounces of yellow ocher, very finely ground in water ; it is then left at rest, and the clear portion decanted, which gives a fine yellow color, that serves, in water gilding, to cover those deep recesses into which the gold cannot be made to enter ; it serves also as a mordant for the gold size.—*The Painter, Gilder, and Varnisher's Companion.*

DEATH WATCH---NATURAL SIZE AND MAGNIFIED.

Among the popular superstitions which the almost general illumination of modern times has not been able to obliterate, the dread of the death watch may well be considerud as one



of the most predominant ; yet it must be allowed to be a very singular circumstance that an animal so common should not be more universally known, and the peculiar noise which it occasionally makes be more universally understood. The insect, an engraving of which we present herewith, in question, is a small beetle belonging to the timber-boring genus, *Anobium*, and the popular superstition alluded to is, that when its beating is heard, it is a sign that some one in the house will die before the end of the year. It is chiefly in the advanced state of spring that this little creature commences its sound, which is no other than the call or signal by which the male and female are led to each other, and which may be considered as analogous to the call of birds; though not owing to the voice of the insect, but to its beating on, or striking, any hard substance with the shield or forepart of the head. The prevailing number of distinct strokes which it beats is from seven to nine or eleven ; and this very circumstance may perhaps still add to the ominous character which it bears among the vulgar. These sounds or beats are given in pretty quick succession, and are repeated at uncertain intervals ; and in old houses, where the insects are numerous, may be heard at almost any hour of the day, especially if the weather be warm. The sound exactly resembles that which may be made by tapping moderately hard with the finger nail on a table. The insect is of a color so exactly resembling that of decayed wood, viz., an obscure grayish brown, that it may for a considerable time elude the search of the inquirer. It is about a quarter of an inch in length, and is moderately thick in proportion, and the wing shells are marked with numerous irregular variegations of a lighter cast than the ground color. It is singular that this insect may so far be familiarized as to be made to beat occasionally, by taking it out of its confinement, and beating on a table or board, when it will readily answer the noise, and will continue to beat as often as required.

Utilization of Pine Leaves.

Near Breslau, in Silesia, are two establishments, one a factory where the pine leaves are converted into what is called "forest wool" or wadding ; the other, an establish ment for invalids, where the waters used in the manufacture of this pine wool are employed as curative agents. The manufacture has extended, for there are now factories at Runda, in the Thuringer-wald, at Jonkoping, in Sweden, Wagenerger, in Holland, in parts of France, and other places. Two cases of these products were shown at the last Paris and Havre Exhibitions, which contained various illustratirns in the shape of wool for stuffing mattresses and other articles of furniture instead of horse-hair, vegetable wadding, and hygienic flannel for medical application, essential oil for rheumatism and skin diseases, cloth made from the fiber, articles of dress, such as inner vests, drawers, hose, shirts, coverlets, chest preservers, etc., and other useful applications. In the preparation of the textile material an ethereal oil is produced, which is employed as a curative agent, for burning, and as a useful solvent. The liquid remaining from the decoction of the leaves is used for medical baths. The membranous substance and refuse are compressed into blocks and used as fuel ; from the resinous matter they contain, they produce sufficient gas for illuminating the factory in which the manufacture is carried on.

Invention of the Spirit Level.

He who first filled a glass bottle with a liquid, leaving a small quantity of air therein to form a bubble, then corked the bottle and laid it flat on one side, with the bubble floating against the upper part was the unconscious inventor of the spirit level, which is a very simple instrument in appearance, but of the utmost value, when properly made, to the astronomer, the engineer, and the builder ; for when the bottle is placed horizontally, the bubble always mounts to, and rests at its most elevated point ; and the tangent to that point, when the middle or apex point of the bubble coincides therewith, is a horizontal line ; that is a line at right angles, or perpendicular to the direction of gravity or the plumb line passing through that point.

This was first perceived and applied, so far as is known, in France in 1666, by Melchisédec Thévenot, who was a great amateur of science and a writer of books of voyages and travels. In this respect he enriched the literature of France as much as Hakluyt enriched that of England half a century earlier. It was at Thévenot's house that the learned men who founded the Academy of Sciences of Paris used to assemble ; and it was at one of their meetings that he propounded the spirit level.

A description of the instrument, accompanied with figures, was first published in the *Journal des Savants*, Paris, November 15, 1666, under this title :—*Machine nouvelle pour la conduite des eaux, pour les bâtiments, pour la navigation, et pour la plupart des autres arts.*" The instrument is there called an air level ; and is described as a glass tube, hermetically sealed at both ends, containing spirits of wine, which do not freeze, and a small quantity of air forming a bubble. It is stated that the instrument is capable of giving, with much exactness, the direction of the horizon, the perpendicular to the horizon, and vertical angles; and that it is easier to make, more convenient to use, and indicates a level line more readily and accurately than any other instrument.

The Colorado Expedition.

The expedition under the command of Col. Powell, the Colorado explorer, has returned to Chicago, having successfully traveled through the entire Grand Cañon, from Green River to the point where the Colorado debouches into the open plain in the territory of Arizona.

From the point where Colonel Powell's last letter was written the expedition descended the river about four hundred miles, between walls almost vertical, ranging from five hundred to one thousand five hundred feet high, the exterior of the cañon being from two thousand five hundred to four thousand feet above the bed of the river. More than two hundred waterfalls and cascades, emptying themselves over the walls of the cañon into the main river, were seen in this distance, with almost every variety of natural scenery. The geological formation of the cañon consists principally of limestone and sandstone ; granite is only found at three places and in a limited amount. No discoveries of precious metals were made, and there were no indications of gold or silver found in the bed of the river.

One section of the cañon was found to consist of a very fine

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beatifully-polished marble, which at present is entirely inaccessible. The country traversed was barren beyond description, and is pronounced by Colonel Powell as not susceptible of cultivation, even by irrigation.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

The Assimilation of Inorganic Substances in the Animal Economy.

Messrs. Editors:—In criticising some remarks on phosphatic bread, which appeared in the Scientific American of September 11th, you ask for the writer's authority for the statement there made, that inorganic matter cannot be assimilated by the animal organism. After a more thorough examination for authority, we are willing to admit that the proposition in question might have been submitted with greater caution.

The "ordinary facts" to which you advert, relating to common salt in food and to preparations of iron administered by physicians to chlorotic patients, if facts, are by no means universally admitted by chemists and physiologists.

Dr. Bellows (late Professor of Chemistry, Physiology, and Hygiene) says of salt, "It is not in any sense nutriment as it does not furnish support to any organ or function, and does nothing toward sustaining life, as has often been proved in the case of the famished sailor who only increases his sufferings by taking salt water in very small quantities." He also says: "There is enough salt in common natural food to account for all the salt actually incorporated into the system."

Frederick William Headland, of the Royal College of Physicians, in London, in a standard work on the action of medicines, in attempting to prove that the iron from the shops does enter into the blood as a part of it says: "In some cases of chlorosis the blood was analyzed before giving iron, and after it had been given for a few weeks, and was found to contain more of red globules after taking the iron than before." But says Dr. Bellows, "scores of cases can be brought where under a different treatment the results were the same and even more striking, without a particle of iron, and my explanation is, that the effect of the iron was that of a mere stimulant promoting sanguification from food taken in the meantime containing iron." Joseph R. Parks.

Muscatine, Iowa.

[Would it not be well for our correspondent to extend his reading to some other author than Dr. Bellows? This brilliant meteor of science has not yet flashed across our horizon; we do not find his name enrolled on any list of standard authorities in our possession. There is evidently some confusion in the minds of some of our correspondents on the constituents of animal and vegetable tissue, and as to what ought to be regarded as organic and inorganic substances. We will, when convenient endeavor to set them right on these points. —Eds.

Spectrum Lines of Aurora.

Messrs. Editors:—During these times of auroral abundance our Canadian skies frequently present interesting scenes. Shortly after midnight on the morning of Sept. 3d, aurora borealis hung over us, waving like luminous canvas floating in the breeze, and forming a brilliant corona near the star Scheat, in Pegasus. The light seemed to flow in two currents, the uppermost remaining quiet, and the lower current changing with great rapidity.

On this occasion I submitted the aurora to careful spectrum analysis, and am happy to report an observation made with the spectroscope, which may help to settle the question of the nature of polar light. I succeeded in obtaining a distinct spectrum, consisting of one very bright line in the yellow and one faint line in the green. The bright line was close to the sodium line D, and coincident with an air line in the solar spectrum. The dim line in the green I could not identify as belonging to any known substance.

The conclusions resulting from the identification of the bright line in the spectrum of aurora are important, showing that polar light is principally incandescent oxygen gas.

The presence of this gas in excess, in regions traversed by aurora, may result from the decomposition of water. The electric currents effecting the separation and rendering the oxygen luminous. The re-union of oxygen and hydrogen form water again, which is visible as a turbid atmosphere, noticeable during auroral displays. But it may be asked, Why do not the lines of hydrogen appear in the spectrum of aurora? The answer is, because its temperature is not sufficiently high to render the gas incandescent. In a partial vacuum oxygen is luminous at a lower temperature than hydrogen, because of its density, which is sixteen times greater, and still increased by the continuous passage of electric currents.

Another question that may arise is this Why does the air line in the spectrum of aurora appear bright, while the same line in the solar spectrum is black? An explanation is found in the fact that there is no sufficient absorbing medium, between the aurora light or luminous oxygen, and the earth, while the solar line is seen after absorption by its passage through a deep luminous stratum of the earth's atmosphere.

Toronto, C. W. D. K. Winder.

Cutters on Reaping Machines.

Messrs. Editors:—Your correspondent in No. 11, current volume, is very much in error in some of his statements, in his criticism of one or two former communications on the subject of cutters for reaping machines: While I fully agree with him that the serrated sections are best, I see no reason for his great "surprise that any one should advocate smooth edges"; in as much as the fact that a great majority of machines have smooth cutters, will abundantly prove that your former correspondent is well sustained. In the second place, it is a great mistake to suppose that "the serrated sections are as hard as it is possible to make steel;" for in that case they would be nearly valueless, as they could neither be straightened nor sharpened; and a long experience with reaping machines in a rough country, has taught me that the bending and battering of these sections are of daily occurrence, and that they can be straightened and ground with impunity. John Milton.

Hillsboro, Va.

The Scientific American Under a Corner Stone.

Messrs. Editors:—Please send me a copy of the Scientific American for September 8, 1869. On the occasion of the laying of the corner stone of the Wesleyan church at this place, my copy of the above date arrived just in time for me to inclose it with the other papers and documents, which, in a hermetically sealed metallic box, were deposited in their (probably) long resting place beneath the corner stone.

I thought that possibly in the far future, the contents of that box might see the light once more, and that no paper on this continent could convey to future generations so correct an idea of the civilization and materal condition of the world in the latter half of the nineteenth century as a copy of the Scientific American.

I thought too, of the "good time" the printers, engravers, inventors, and scientists of that (future) age would have over the resurrection of a well-preserved copy of the Scientific American of September 18, 1869.

Perhaps, long after your able efforts are ended, and your dust has mingled with mother earth, some future editor of the Scientific American will be permitted to see this embodiment of the invention, art, and science of the present day, and write a splendid leader on "Wonderful results of Invention: The Nineteenth Century and the Present Age," or some other theme which so pregnant a sheet would suggest.

Meantime be it mine to thank you for the pleasure and instruction which your journal always affords me.

James Stimson, M. D.

St. George, Brant Co., Ontario.

The Hartford Steam Boiler Inspection and Insurance Company.

This company make the following report for the month of August, 1869:

During the month 390 visits of inspection have been made, 584 boilers examined, 579 externally, and 156 internally, and 45 tested by hydrostatic pressure. The number of defects discovered, 403—of which 20 were especially dangerous. These defects were as follows: Furnaces out of shape, 17—1 dangerous; fractures in all, 196; burned plates, 25—1 dangerous; blistered plates, 38—1 dangerous; cases of incrustation and scale, 57—2 dangerous; cases of external corrosion, 26—5 dangerous; cases of internal corrosion, 1; cases of internal grooving, 1; water gages out of order, 8; blow out apparatus out of order, 6; safety valve overloaded, 15—6 dangerous; pressure gages out of order, 39—1 dangerous; boilers without gages, 5; cases of deficiency of water, 5; boilers without blow-out apparatus, 1—dangerous; boilers condemned as unfit for use, 2—both dangerous.

In commenting upon the above record, we can say but little that has not already been said. A marked improvement in one respect, however, will be noticed. And that is, that there are less dangerous defects than are usuallly noticed in our monthly reports, and as the business of the company increases, this improvement in the condition of boilers under its care will be more and more apparent, for when defects are discovered by the inspectors' periodical visits, they are pointed out and at once repaired. The expense is comparatively small, little time is required, and the boiler or boilers are thus kept in good condition.

When boilers are left for months or years without careful examination, they become badly corroded, incrusted, or burned, so that when they are overhauled for repairs, they are often found not worth repairing, or if repaired, at a cost nearly equaling the expense of new ones. It is an old adage that "a stitch in time saves nine," and this is as true in the case of steam boilers, as in the case of the good housewife who "sews tares while the husbandman sleeps."

Fractures, which are too numerous, are the result, either of faulty construction or poor management. Mr. Henry Hiller, chief engineer of the National Boiler Insurance Co., of Manchester, England, in his annual report, says of this difficulty. "The fractures at the seams and over the furnaces of externally fired boilers, some of which were of a most dangerous character, were due to various causes; viz., faulty arrangements of feed pipes, sedimentary water, or irregular working and firing. When the feed water contains much sediment, frequent cleaning of the interior of this class of boiler is especially necessary."

External corrosion is a serious evil, and one to which careful attention should be given. Boilers that are bricked in, are especially liable to this difficulty. A slight leak at the seams, goes on wearing away the plates until they are reduced to a very dangerous thinness. We have in our collection several specimens showing the insidious work of this evil. One specimen of plate is reduced to the thinness of paper, and the day before our inspector discovered it, 80-pounds pressure was used on the boiler. We copy from the report of Mr. Edward B. Marten, chief engineer of the Midland Boiler Inspection and Assurance Co., Stourbridge, England, with whose report we have recently been favored.

"In one or two cases frequent warnings as to damage going on from leaking fittings have been disregarded, until absolute danger has been reported, and when the boilers have been cleaned off and examined, those in charge have been dismayed at the extent of the corrosion in a short time. All leaking in the brick work around boilers should be entirely stopped if they are to last their proper time and work in safety." The over-loading of safety valves is still a prevalent evil, and one the steam users should be more particular in guarding against. The safety valve should be frequently raised, but this should be gently done. Never raise it suddenly, nor let it drop heavily upon its seat, for, by so doing the spindle may be bent, thus making its seating imperfect.

One of our inspectors reports 2 safety valves with corroded seats, and rusted fast. Now it is evident that an inoperative safety valve is worse than none, for while there is the appearance of safety, there is positive danger.

It will be noticed that 2 boilers have been condemned as unfit for use. The searching investigation which is given to boilers will discover weak points, if such there are, and we presume that many boilers in use would be at once condemned if they were thorough inspected by competent men.

We could extend these comments on all the defects and defective attachments of boilers, but space forbids. We shall take up other points in future.

OBITUARY.—THOMAS GRAHAM CHEMIST.

A cable dispatch from London reports the death in that city of Thomas Graham, the celebrated chemist and Master of the Mint. He was born in Glasgow, Scotland, on the 21st of December, 1805—his father being a merchant and manufacturer in that city. Mr. Graham was educated at Glasgow School, and subsequently at the University of Glasgow, where he graduated, taking the degree of M.A., in 1826. He then moved to Edinburgh, but at the end of two years, returned to his native place and established a laboratory for the practical study of chemistry. He also lectured at the Mechanics' Institute, and was elected Andersonian Professor at Glasgow. This office he held until 1837, when he resigned for the purpose of accepting the Professorship of Chemistry in the London University, to which he had been appointed. In 1855 Sir John Herschel retired from the Mastership of the Mint, and Mr. Graham was appointed to fill the vacancy, holding the position with credit until his death.

There has probably been no chemist in Great Britain of equal ability to Mr. Graham during the past quarter of a century. His study of the sciences was complete, and his discoveries and works have been of great scientific importance to the world. His most remarkable discoveries were the law of the diffusion of gases, the diffusion of liquids, and the new method of separation known as dialysis. For the first named discovery he received the Kieth prize of the Royal Society of Edinburgh in 1834, and for the last, the Copley medal of the Royal Society in 1862. Of his literary productions, the most important and best known, is "Elements of Chemistry," which has been extensively circulated and read in Great Britain and Germany, and is also a familiar work to scientific students in the United States and other parts of the world. Mr. Graham was elected a Fellow of the Royal Society in 1836, a corresponding member of the Academy of Sciences of the Institute of France in 1848, and was created an honorary D.C.L. by Oxford University in 1855.

The readers of the Scientific American will remember the account given on page 244, of our last volume, of the discoveries made by Mr. Graham respecting the properties of hydrogen.

Gas for Lighthouses.

A series of letters and reports sent to the Commissioners of Lighthouses and the Board of Trade has resulted in a request being made to Professor Tyndall, by the latter body, that he would report upon the proposal to substitute gas for oil as an illuminating power for lighthouses, as illustrated in the lighthouses of Howth Baily and Wicklow Head. Various experiments were made at Howth Baily, and Professor Tyndall says that the superiority of the gas over the oil flame is rendered very conspicuous by these experiments. The 28-jet burner possesses 2½ times, the 48-jet burner 4¼ times, the 68-jet burner 7¼ times, the 88-jet burner 9¾ times, and the 108-jet burner 13 times the illuminating power of the four-wick flame. The oil lamp with which the gas flame was compared was the most perfect one employed by the Commissioners of Irish Lights. Further experiments were also made, and it appeared that the whole of the gas-lighting apparatus was entirely under the control of the keeper, and that no damage was likely to arise from it. The 28-jet gas burner, when seen from a position some miles off, appeared to be very nearly upon an equality with the oil lamps, but when muffled to represent a fog it had a slight advantage. Of course with the brighter jet burners a great improvement was apparent, and before the 108-jet burner the oil lamp grew quite pale. By the adoption of a system of gas lighting a great saving in cost would be effected; but such a system would not be possible on rock lighthouses. Professor Tyndall recommends the encouragement of this system of illumination in Ireland.

To kill cockroaches take carbolic acid and powdered camphor in equal parts; put them in a bottle; they will become fluid. With a painter's brush of the size called a sash tool, put the mixture on the cracks or places where the "critters" hide; they will come out at once. It is wonderful to see the heroism with which they move to certain death. Nothing more sublime in history; the extirpation is certain and complete. While on this theme I would add that a mixture of carbolic acid with water—one-fourth acid three-fourths water—put on a dog, will kill fleas at once. I have seen it tried.

G. W. B.

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Darwinism and Design.

(From the Student.)

Darwinism is only one of several branches of a kind of philosophy long known to students of the historical developments of human thought. The Darwinian apparatus consists in a multitude of facts collected from an immense field of research, and pointing to particular methods by which hereditary changes in the organic world may lead to the preservation or extinction of particular forms. That offspring sometimes vary from the parent type is beyond dispute; that such variations are sometimes hereditary, is equally beyond dispute, nor can any one deny that when a modification arises which gives a group of creatures more power to fight their battle of life, they will be benefited thereby, and may multiply and flourish in situations where creatures not so modified would die out.

The extent to which Darwin's "Natural Selection" is sufficient to account for the changes that have occurred, is open to question. Laws and principles of which we have as yet no cognizance, may assume an importance we are not prepared for; but no fresh discovery can invalidate the facts on which Darwin and his followers rely. No one who has weeded a garden can doubt the reality of the "battle of life" which he portrays, and no one who has watched insects attacking plants, birds assailing insects, and climate with its fluctuations, frequently fighting against all, can doubt that the natural world does present a scene of struggle, in which the strongest and the best protected prevail, while the weaker and less protected have to give way.

Of course, such terms as "strong" and "weak" must be understood in a wide sense—a delicately-organized plant, for example, may be characterized by the former epithet, when compared with a much more robust vegetable, if it surpasses the latter in power of extracting nutriment from a particular soil, or in withstanding prolonged drought, excess of moisture, or extremes of temperature. But the natural world is not made up of contention and strife any more than those elements constitute the sum of human society. Natural adaptations of the most varied and wonderful kinds abound, none being more remarkable than those which the Darwinians adduce. What can be more amazing than the dependence of a flower upon an insect, so that the butterfly, moth, or humble bee is made the carrier of pollen from one corolla to another, and an animal thus provides for the perpetuation of a vegetable race. What savors more of design than the "mimicry" which has been frequently illustrated in our pages, a plan by which a defenseless creature assumes the aspect of a strong one, a delicate creature the appearance of a tough one, or a butterfly when perching on a twig becomes indistinguishable from a dead leaf, and in each case enemies are deceived, and security obtained?

If a new writer desired to compile the most elaborate and convincing series of design arguments, he would have recourse to the Darwinian armory for the most striking of recently ascertained facts. Why, then, is Darwinism in many quarters contrasted with and opposed to design? The answer may be found in the defects of the older forms of the design argument, rather than in any conclusion that logically follows from Darwinian speculations.

Many of the older comparative anatomists contented themselves with regarding animal or vegetable organization simply from what is called the teleological point of view. They saw, or fancied they saw, the final cause, or reason why, everything was done. They collected together a great mass of information concerning special adaptations, and it was assumed that no organ, or portion of an animal, not deformed, was without its special use to that particular creature; but plain and palpable facts did not sustain the universal application of this theory. Animals were found with rudimentary parts—bones, for example, which, if developed, might have supported a kangaroo-like pouch—to which no function could be assigned, and in these cases, which are very numerous, the doctrine of special application broke down. Then came theories of "types," and if anything appeared in a creature that was not of any use to it, the explanation was that the creature in question belonged to a group all formed according to "type," and the rudimentary, or useless part, was put in to make it conform to the typical idea, something like the procedure of the old gardener, who had a particular "type" of uniformity so strongly in his mind, that, having put a naughty boy in one corner, he put a good boy in the opposite one not to damage the design. Further knowledge left the "types" high and dry on the shores of metaphysical abstraction, and introduced the notion of descent with variations, according to which the occurrence of non-essential, useless, or rudimentary points admits of easy explanation.

That certain animals see because they have eyes, and that birds fly because they have wings, are statements not inconsistent with the doctrines of final causes, though it is easy to place them in opposition to the common assertion that the animals in question were endowed with eyes in order that they might see, and that the birds were gifted with wings in order that they might fly. To perfect the design argument when it is applied to elucidate a system of descent with modifications, struggles with life conditions, and the survival of the fittest, we have to show reasons for believing that the changes which occur in the organic world, follow a law, or set of laws, indicative of intelligence, and capable of working out beneficial results. At present, the physiological laws which determine the condition under which offspring faithfully transmit or depart from the peculiarities of the parental type are unknown, and it is only a very small portion of the natural plan that comes within cognizance. So that we cannot expect to have clear information as to either purposes or conclusions. Darwin observes, "however much we may wish it, we cannot blindly follow Professor Asa Grey in his belief, that variation has been led 'along certain beneficial lines like a stream along definite and useful lines of irrigation.' If we assume that each particular variation was from the beginning of all time preordained, the plasticity of organization which leads to many injurious deviations of structure, as well as that redundant power of reproduction which invariably leads to a struggle for existence, and as a consequence to the selection or survival of the fittest, must appear to us superfluous laws of nature."

We cited this passage and remarked upon it when it was first published in Mr. Darwin's "Plants and Animals under Domestication." His argument simply reminds us of a difficulty not at all peculiar to natural history or physiology, but which encounters us in all directions. Evidently it is not the design of nature to reach what we call good ends, without what look like breaks, interruptions, and failures. If speculations on the modifications of organic beings according to the principles of Mr. Darwin, bring us into contact with many fresh puzzles and perplexities of this description, they also supply a fresh store of facts, which tend to increase our belief that the system is conformable to our religious instincts and moral nature. No natural theologian can affirm that any theory yet propounded, supplies a satisfactory explanation of all the moral difficulties, or intellectual difficulties which stand in the way or a perfect comprehension of the character of the great plan. Why it is obviously benevolent in a thousand directions, and apparently harsh in a thousand others, we do not *know*, any more from Darwin than we did from Paley, but we certainly are not left in a denser mist; and as modern researches have enabled us to catch glimpses of a far wider, more complicated, and comprehensive plan than the older thinkers had any conception of, we may, while lamenting the limitations of our mental vision, take comfort in the belief that in the vast regions of the yet unknown, there lie ample satisfaction for all our hopes, and ample resolution of all our doubt.

How to Preserve Pencil Drawings.

An ingenious means of effecting this has been invented by M. E. Rouget, of Paris. This invention consists in obtaining the fixation of such drawings, tracings, or sketches, by directly projecting on these latter any suitable adhesive liquid reduced ty a fine spray, or in what is commonly called the atomized or pulverized state, by causing the liquid to pass rapidly under pressure through one or more capilliary tubes or openings. By this method the defects of the transudation process are entirely done away with, besides which the operation is executed in less time, and may be performed at once by the artist without the slightest difficulty. As for the fixation liquid, any colorless, or nearly colorless, liquid which allows of being atomized, and which, after becoming dry, causes the particles of the charcoal, or other drawing materials made use of, to adhere sufficiently firmly to the paper or other drawing surface, may serve for the purpose. Thus, for instance, a liquid, which has given the patentee the most satisfactory results, is obtained by adding to a solution of three ounces of white sugar candy and two ounces of white shellac in about two pints of spirits of wine, a decoction of about one ounce of fucus crispus in one pint of distilled water.

Extraordinary Phenomenon.

On the evening of the 30th May the inhabitants of Greiffenberg, Germany, and the neighboring villages, for more than a German mile in circuit, were the witnesses of an extraordinary natural phenomenon. Between nine and ten o'clock thunder clouds seemed to be gathering around the Iser and Risengebirge, to the south, while the rest of the sky appeared to be covered only by light clouds. Now and then a few flashes of lightning were seen in the far distance. Suddenly all eyes were blinded by a fall of fire, differing both in form and color from common lightning, which was followed in four or five seconds by a deep and terrific report, like a loud peal of thunder. All the windows rattled and the houses seemed shaken to their foundations. Those who were in the open air say that they seemed to be wrapped in fire and deprived of air some instants. A mild and moderate rain, without thunder or lightning, followed. Opinions differ as to whether the above appearances are to be attributed to a meteor or to a sudden discharge of electricity.

Radiation of Heat from the Moon.

The Earl of Rosse is making a series of experiments by means of a thermo-pile of four elements and a 3-foot telescope, to determine, if possible, what proportion of the moon's heat consists of: 1. That coming from the interior of the moon, which will not vary with the phase; 2. That which falls from the sun on the moon's surface, and is at once reflected regularly and irregularly; 3. That which falling from the sun on the moon's surface is absorbed, raises the temperature of the moon's surface, and is afterwards radiated as heat of low refrangibility. The chief result arrived at up to the present moment is, that (the radiating power of the moon being taken as equal to lampblack, and the earth's atmosphere supposed not to affect the result) a deviation of 90° for full moon appears to indicate an elevation of temperature =500° Fah. The relative amount of solar and lunar radiation was found=89819 : 1.

Persine.

After taking food, a fluid, called "gastric juice," flows into the stomach. This liquid contains an active principle which chemical philosophers term pepsine. This body possesses a remarkable property, namely, that of converting all those substances which are known as food from the solid to the fluid state; a condition clearly necessary for its assimilation or digestion before it can enter the tissues of the body, and form the new blood requisite to sustain life. Pepsine can be artificially extracted from the stomach of a recently killed animal, that of a pig or calf in particular, and when it is placed in contact with minced-up boiled egg, butcher's meat, etc., in a glass vessel, it dissolves the meat apparently in the same way as it does in the living stomach. Substances which are occasionally taken into the stomach, such as the stones of fruit, the rind of raisins, or Orleans plums, are unacted upon by pepsine; hence such substances are truly said to be indigestible. Physicians often administer pepsine in cases where indigestion of the ordinary food occurs, and in many cases with marked benefit. The inordinate use of tobacco, ardent spirits, and condiments, arrests the flow of the gastric juice; hence the evils resulting from it. The preparation sold by most druggists, under the name of pepsine, consists of dried and powdered glandular layers of the stomachs of pigs or calves.—*S. Piesse.*

Editorial Summary.

A HEALTHY MIND IN A HEALTHY BODY.—How beneficent is the scheme in which joy begets health, and health promotes joy. Good news will give a good digestion. The sight of land has cured the scurvy in sailors. And so the head and stomach act and re-act upon each other; the head being king, the stomach a loyal and ever-grateful subject, that bounteously returns all good favors. The stomach that is well served produces a healthy body, in which the healthy mind dwells at ease, and is ever fully alive to all honorable and holy pleasures. On the body in perfect health, the mind has perfect control. Then surely the first care of every rational being should be to put all in order in the mind's tenement, since the art of attaining high health is that of reaching sound morals and elevated thoughts.

NEW LIME LIGHT WITHOUT OXYGEN.—A brilliant and steady light has been obtained by the Messrs. Darker from a mixture of common gas and atmospheric air, the latter of which contains more than a fifth part of oxygen. The air and gas are either mixed as in the Bourbouze lamp, or are emitted singly, as in some forms of the oxy-hydrogen burner. Instead, however, of the intense heat thus obtained, being employed to raise to a white heat a platina gauze cap, as proposed two years ago by M. Bourbouze, Messrs. Darker cause the flame to impinge upon lime or magnesia, either singly or in combination with asbestos, and thus obtain a light of great purity and intensity. The lime light has thus been got without the trouble and expense attendant upon the employment of pure oxygen.

A BRONZING process, applicable to porcelain, stoneware, and composition, picture, and looking-glass frames is performed as follows: The articles are first done over with a thin solution of water-glass by the aid of a soft brush. Bronze powder is then dusted on, and any excess not adherent is knocked off by a few gentle taps. The article is next heated, to dry the silicate, and the bronze becomes firmly attached. Probably, in the case of porcelain, biscuit, or stoneware, some chemical union of the silicate will take place, but in other cases the water-glass will only tend to make the bronze powder adhere to the surface. After the heating, the bronze may be polished or burnished with agate tools.

AVERAGE DUTY OF CORNISH ENGINES.—An estimate of the average duty of this class of engines, based on observations made upon eighteen engines during one month, shows the following results: They have consumed 1,377 tuns of coal, and lifted 10·2 million tuns of water 10 fathoms high. The average duty of the whole is, therefore, 50,100,000 pounds, lifted one foot high, by the consumption of 112 pounds of coal.

A CURE FOR SOMNAMBULISM.—Professor Pellizzari, of Florence, has hit upon a cure for somnambulism. It simply consists in winding once or twice round one's leg, on going to bed, a thin flexible copper wire, long enough to reach the floor. Eighteen somnambulists, treaten in this way, have been either permanently or temporarily cured. The *Gazetta Medica*, of Venice, which reports the fact, says that copper wire is known to dissipate magnetic somnambulism, and that this circumstance led the professor to have recourse to this strange remedy.

TWO spirited Frenchmen, Messieurs Tissander and de Fouvièlle, have undertaken the daring enterprise of reaching the north pole in a balloon. The machine in which the bold adventurers are about to embark on their perilous journey, and which is appropriately named "Le Pôle Nord," is now being completed in the Champ de Mars, which the government have placed at their disposal for the purpose. The car, a marvel, it is said, of strength and lightness, is constructed to carry ten passengers, 4,000 lbs. of ballast, and provisions for a month.

THE GERNER BOILER.—In answer to some inquiries in relation to the heating surfaces of the two boilers, alluded to in our last issue under the above title, we would say that the heating surface of the stationary boiler tested is 144 square feet, and that of the marine boiler at the offices of the New York and Erie Railroad is 400 square feet.

MR. LOCKWOODE, in referring to his article on the Manufacture of Plate Glass, page 199, current volume, wishes us to say that the grinding machines of the Birmingham Works turn out 12,000 feet of glass, and that the Lenox Company commenced their operations at Cheshire, Mass.

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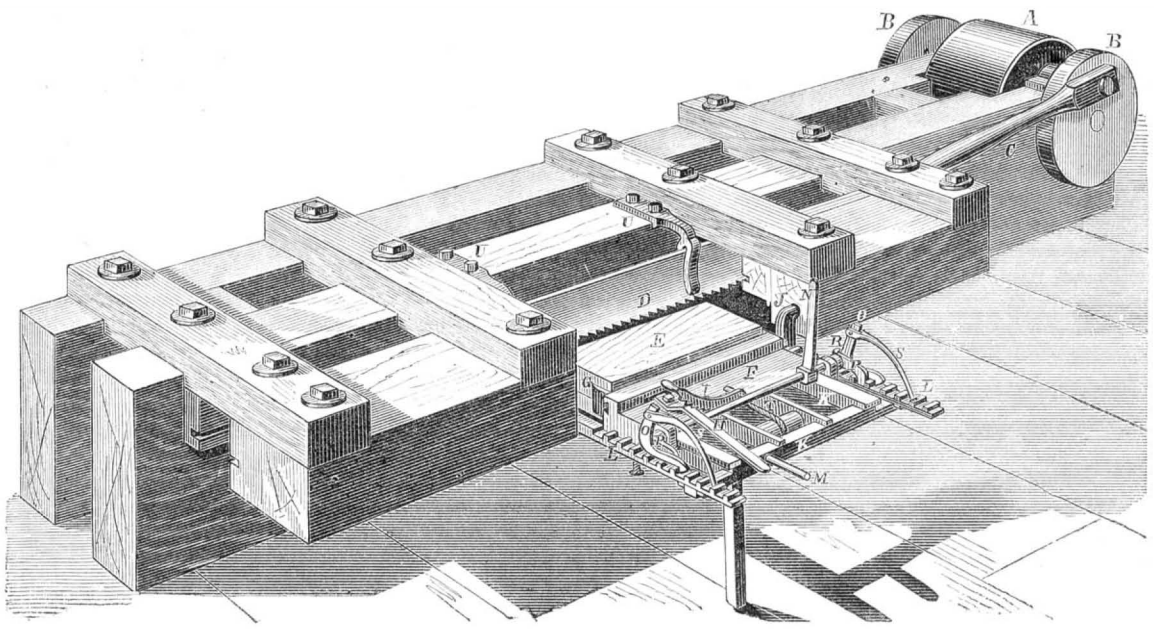
Improved Machine for Cutting Staves.

Two classes of machines have been employed for cutting staves; namely, those which operate upon the principle of cleavage, the wood being first steamed, and those which saw out the stave with curved faces. Of the latter class, the barrel-saw machines have been principally employed notwithstanding there are radical defects in the operation, well known to those who use them; one of the principal faults being, that in obstinate descriptions of wood, these saws will become more or less cramped out of their circular form, bind, and otherwise vex the operator, as well as perform the work imperfectly.

The improved machine herewith illustrated, may be used advantageously for cutting staves in all kinds of wood, hard and soft, and for all sizes of staves within ordinary requirements; and it could also be constructed to cut staves for the largest brewers and dyers' tanks, by sufficiently enlarging its dimensions, a great advantage over machines employing barrel saws, which cannot be employed for cutting staves of great length. In short it is one of the most substantial, and best constructed machines for this work we have ever met with.



BISHOP'S STAVE-CUTTING MACHINE.

Its operation will be readily understood by reference to the engraving in connection with the following explanations:

A is the main driving pulley keyed to a shaft which carries two crank and fly wheels, B, through which power is conveyed to the other working parts of the machines, of which there may be one on each side of the wood frame-work, but only one of which is shown in the engraving. C is the connecting rod or pitman which drives the saw, D.

This saw is concave on the side shown in the engraving, the curvature being that desired for the staves. This form gives it great rigidity, so that no saw gate or stretching apparatus is required. Guides, U, attached to the frame work are provided to steady the saw when working in obstinate kinds of timber, and the saw may be removed for filing and setting by simply taking out the key which connects it with the pitman.

Despensing with the gate renders the motion of the saw very light and a perfectly parallel motion is secured through guides not shown in the engraving, fastened to the interior of the frame work. The bolt, E, is laid on the metallic carriage, F, which slides on ways formed on the oscillating frame K. The frame, K, oscillates on the centers, J, by which the bolt is brought up toward the edge of the saw in an arc of a circle corresponding accurately to the concavity of the saw, This motion is imparted to the oscillating frame by the operator, who grasps with his left hand the handle, M, while the bolt is fed by an apparatus operated by the handle, N, and yet to be described.

The bolt is firmly held by spurs, G, one on each side of the metallic carriage, F, one of which is movable, and is driven home by the pivoted lever, H, and held there by the toothed arc, I, which engages with the lever, H, while the bolt is being sawed. The toothed arc, I, is provided with a suitable handle for raising it when it is desired to release the lever, H, and through it the movable spur, G.

We will now endeavor to make plain the means by which the feeding is accomplished. The prime motion by which this is attained is imparted by the right hand of the operator through the lever, N. When this is moved toward the saw, the bent pawls or hooks, O, attached to a common rock shaft with the lever, N, and which, while each stave is being cut, engage with the racks, L, preventing any motion of the metallic carriage toward the saw, are disengaged from the racks, L, at the same time that the upper and longer pawls, S, are drawn toward the saw and take in another tooth on the racks. The pawls, P, which play loosely on the rock shaft and engage with the opposite side of the same tooth with which O engages and prevents any motion of the carriage from the saw, are also lifted by means of an angular projection shown at R, which engages with the back side of O, as shown in the engraving. The motion of the lever, N, being then reversed, the pawls, S, engage with the tooth taken in by the former motion and the pivots which connect them with the bent pawls or hooks, O, become fulcrums of the lever, M, through which the carriage is forced along toward the saw until the bent pawls or hooks, O, again engage with the racks, L, preventing all further motion toward the saw, while at the same time the pawls, P, also engage with the rack as shown, preventing all backward movement. These pawls are so adjusted that the single forward and backward movement of the lever, M, described, feeds the bolt onward exactly the thickness of one stave; these movements being made at the same time, the front side of the frame in which the carriage rests is raised in order to bring the carriage on the opposite side of the frame down low enough to let the upper side of the bolt come under the edge of the saw.

The movements in feeding are therefore as follows, the left hand of the workman grasping the handle, M, raises the front side of the oscillating frame and depresses the bolt, while the right hand grasping the lever, N, moves it quickly backward and forward and the feeding is accomplished. Both movements are accomplished instantaneously and simultaneously. A cord or strap, T, attached to the carriage, F, and running over the roller shown in the engraving, thence over a pulley attached to the under side of the carriage, F, thence through a hole in the floor, has a weight attached which serves both as a counterpoise to the oscillating frame, K, and also acts to throw the carriage to the front when the pawls are raised.

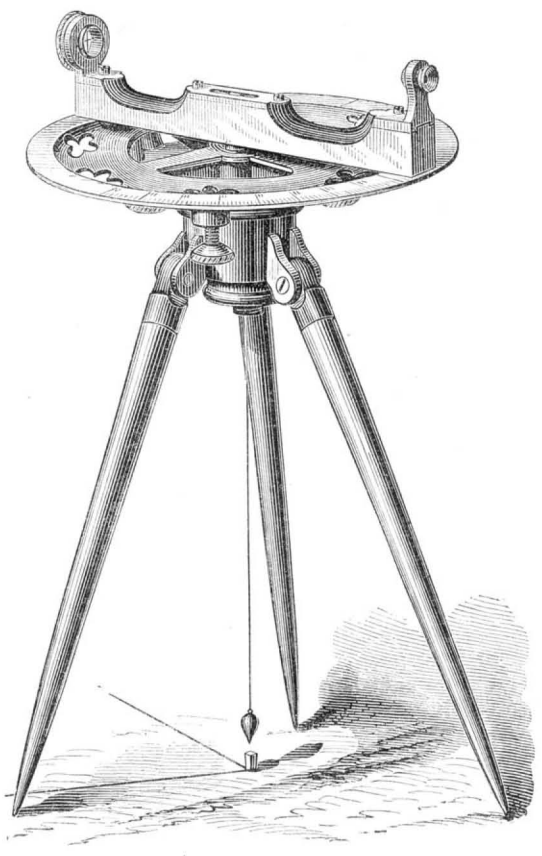
This machine has been in practical use three years, and the inventor informs us that no repairs have been found necessary during that time. He further states that a machine carrying two saws, with the attendance of two men will cut on the average seven thousand staves per day, these staves being sufficiently smooth and uniform, to be, after jointing, immediately set up into casks. Patented through the Scientific American Patent Agency, March 24, 1868, by W. R. and O. D. Bishop.

Orders for State rights, county rights, and machines, may be addressed to George M. Beach, Milwaukee, Wis., agent for the sale of this improvement.

SIBLEY'S IMPROVED LEVELING INSTRUMENT.

The instruments heretofore employed for leveling by surveyors and engineers, though excellent for the purpose and equally well adapted for carpenters and masons, in staking out foundations, or for farmers in leveling for ditching, etc., or for mechanics in general, were too costly for general use in their application to the purposes specified.

The invention herewith illustrated can be placed in the hands of all who desire it, at one fifth the cost of the old style of leveling instruments, and for most of the purposes alluded to is equally as good. For all distances within the scope of unaided vision they are sufficiently accurate.



This level is made of iron, which is one reason why it can be afforded so cheaply.

At one end it is provided with a sight having a small aperture with a short tube attached, to obviate the dazzling effect of the light, consequent upon reflection from the edges of the aperture. At the opposite end of the level is a ring with cross wires, so adjusted that the center of the sight aperture and the intersection of the wires are level when the bubble at the center indicates that the instrument is level.

The level stands on a circular graduated table, from the center of the under side of which is suspended a plumb in the usual manner. This plumb being adjusted over any point, as the corner of a building lot, and the first line laid out, stakes can be set in a line drawn at any desired angle to the first line, by simply turning the level upon a central pivot provided for that purpose, the required number of degrees as indicated on the graduated table.

The level is of ample length to secure accuracy in sighting, and the small aperture in the sight also enables the operator to run a line with great certainty. Being made of iron, it is not liable to warp or spring. The level may be lifted off the table and the adjustment made by screws provided for that purpose. Milled thumb-nuts and screws are also provided to adjust the table to level, and a neat tripod sustains the working parts of the instrument when in use.

Patented June 23, 1868. Address for further information the Warwick Tool Company, Middletown, Conn.

The Phosphoroscope.

If a person places a poker in the fire, everybody knows that a quantity of heat can be carried by it into the next room. Heat, then, like water in a jug, can be taken into certain things and carried away from its source. Not so with sound; there is nothing yet known that will hold sound, and make itself tangible to our senses when taken away from that which produces it. Odors, like heat, are however absorbed by the hardest precious stones and polished steel. Neither the most delicate scales nor the most powerful microscope will discover anything on a diamond that has been near to musk or patchouly; but their fragrance announces the fact of retention and emission of odor. Hitherto it has been an axiom that when the light is put out we shall be in the dark. Modern science now proves to us this need not always be so; on the contrary, we can now carry light away from its source. We can, as it were, bottle up some light, and store it away in a dark cellar, assured that it is there, for we can see it. In proof of this assertion a pretty toy has been constructed for this purpose, called a phosphoroscope or light-bearer, by Messrs. Harvey and Reynolds, of Leeds. It consists of an apparatus like a color-box, which contains, instead of paints, certain glass tubes, holding various light absorbers, such as sulphides of lime, strontium, barium, etc. By exposing this light box to the full flame of a gas-burner, or to the sun, or to the light of burning magnesium, light is absorbed to such an extent that any one can see what's o'clock in the dark. Each tube, according to its contents, glows with light, but of different colors, some red, others blue; but the brightest is the green. The venders call this instrument "The Phosphoroscope, or a Trap to catch a Sunbeam."—*Septimus Piesse.*

AERO-STEAM ENGINES---STORM'S EXPERIMENTS.

During a period of several years, dating from about 1851, Wm. Mount Storm, an inventor and engineer of considerable note, made a series of experiments with air and gases in connection with steam, with a view to promote economy in fuel used for generating motive power. An engine, called the "Cloud Engine," was exhibited by him at the Fair of the American Institute in 1855. The engine was named as above from the fact that the air, which was mingled in the cylinder with the steam, changed the latter into a vesicular condition, resembling fog. The inventor claimed 33 per cent, and those who saw it state that, at times, it did actually make a gain of even more than this.

Its operation was, however, fitful and unreliable, and it finally was withdrawn from public attention, and nothing more has been heard from it.

None of these experiments, however, seems to have been made on the same principles as those of Mr. George Warsop, of Nottingham, whose object is to attain to a method whereby the expansive force of heated air may be used in an engine without the difficulties attending the use of heated air alone in the cylinder, and which are met with in the engines of Ericsson, and others employing only heated airs.

In Warsop's experiments the object seems to have been to make steam assist in applying the expansive force of air.

Warsop, however, has found that a maximum effect from mixed air and steam depends upon the proper proportion of the two gaseous bodies, a conclusion which might have been theoretically drawn from a consideration of the relative capacities of air and steam for heat. Still such an inference would scarcely have warranted great hopes of economy from this source without extended experiment, and although extraordinary results—stated in a former article—are claimed, we shall not be surprised to hear that some offset to these claims has ere long been discovered.

Incidental to the results sought by Warsop is of course a better circulation in the boiler employed to generate the steam used in the experiments, from which some gain might be expected, though nothing like what is claimed.

In December, 1866, D. B. Tanger, of Bellefontaine, Ohio, took out a patent for a steam generator, between which and the apparatus of Warsop we can recognize no essential difference.

Joseph Whitworth, the inventor of the Whitworth gun, and Wm. Fairbairn, the celebrated engineer, have been created baronets.

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STEAM PIPES AS CAUSES OF FIRE.

The extract from the *Bulletin* of the National Association of Wool Manufacturers upon this subject, published recently in the SCIENTIFIC AMERICAN, has attracted much attention and excited some alarm in the minds of many using such apparatus. Some of these have made examinations into the condition of the wood work in the vicinity of such pipes and report "all right." Some have kindly sent us specimens of the wood, showing its condition after exposure for a considerable time to the action of the heat from steam pipes. Should the article in question lead to a general examination, and should our correspondents be communicative, it is probable much useful information would be elicited. Among those who have favored us with specimens are Dr. Daniel Ayres, of Brooklyn, N. Y. The chips presented by this gentleman were taken from wood in contact with pipes of the low-steam warming and ventilating apparatus, made by D. R. Benton of the same city.

The wood appears somewhat like that which has undergone what is known as dry rot, but shows no signs of combustion. It is remarkably dry, light, and brittle, may be much of it crumbled to pieces by the fingers, and is evidently in a condition to be ignited at a comparatively low temperature. These chips are of spruce timber, with some apparently of pine, which are the most brittle.

We are decidedly of the opinion that these chips would not ignite at any temperature to which they have been exposed during several years in the building from which they were taken, but we should decidedly fear their ignition in contact with pipes filled with high steam.

Some experiments to test the temperature at which wood in this condition would ignite would be of great practical value in settling the question of safety in using steam pipes for heating purposes, and we trust such experiments will be performed by some competent person, and their results made public.

A. H. Walker, of Oswego, N. Y., sends us a specimen of excellent tinder into which some new sack cloth placed in contact with pipes carrying steam at sixty pounds, six months since, has been converted. It is strongly suggestive of fire in its appearance, and catches and continues to burn from the slightest spark.

We would like to see this subject thoroughly ventilated and some definite and reliable conclusion reached in regard to it. The question is one of the utmost importance, and all its bearings should be thoroughly understood.

AMERICAN ENGINEERING IN CHINA.

Ting, late Taotai of Shanghai, the present Footai of the province, whatever these titles may imply, commenced in 1865 an arsenal on a small scale at that city. The works cover about half a mile square, and have been carried to completion under the direction of F. J. Falls, a citizen of the United States.

The Shanghai *News-Letter*, now before us, gives some details of interest, from which we extract some items.

In each of the different departments there is a mandarin, acting as an overseer over the native workmen, to prevent idleness among them, and to exercise a general control, but not in any way to instruct the native workmen, this being done entirely by the foreigners acting as foremen, etc. All the accounts of the arsenal are kept by Chinese officers.

Some steamers have been constructed, launched, and supplied with guns, and more are now under way, in addition to which one vessel 280 feet long and another vessel 260 feet long are projected—entire machinery, boilers, engines, and armament to be constructed at the arsenal.

A college is in formation, and literary men, appointed by the government, are at present employed with foreigners, translating works on mathematics engineering, chemistry, etc., in order to prepare class books in the Chinese language for the use of the arsenal, to b read throughout the middle kingdom, to educate the Chinese in all that relates to an arsenal, ship building, etc.

Engineering students are to learn mechanics in the college, and the practical parts in the shops. Navigating students are to have a large training ship, so that they may learn seamanship practically and theoretically.

The works contain a drawing department, pattern shop, foundery, forging shop, boiler shop, musket shop, engine shop, heavy machine engine and gun workshop, erecting shop, musket-finishing shop, shop for finishing shells, shop for the manufacture of Congreve rockets, rocket tubes, etc., mold loft, yards, storehouses, etc., all fitted out with approved tools and fixtures. Additional heavy machinery has been ordered from England.

Mr. Falls has gained the confidence of the Chinese, and has also the confidence and hearty support of his own officers; and the Chinese Government, being desirous of building steam vessels, and having every confidence in Mr. Falls, leave the entire responsibility of their construction with him.

The earlier energetic efforts made have now grown into successful results, and are fast growing into larger proportions, which will greatly contribute to the building up and regeneration of the Chinese nation, resulting in advancing the Chinese people, to make China strong in her own resources; to make her a living nation.

To Mr. Fall's able supervision, with the hearty support of his officers, Fung-ta-jen and Sung-ta-jen, also with the zeal of subordinate mandarins, these good results are being brought about. This able engineer is entitled to the respect of his fellow-citizens, as his energy and ability reflect credit upon his native country.

THE EXHIBITION OF THE AMERICAN INSTITUTE.

The present writing found the machinery department still incomplete. Only three of the engines exhibited were running, driven by Root's boiler, the setting of Harrison's boiler being yet uncompleted. Only a few of the machines were in operation, and, as nearly every exhibitor was too busy in arranging his machinery to give information, we decided to again defer a notice of this department; and though it contains more of general interest to our readers than probably any other in the Fair, we must ask them to accompany us, for the present, in a ramble first through the

SILK DEPARTMENT.

Those of our readers who have followed the various articles on the manufacture of silk, published in these columns during the past year, are pretty well informed in regard to the present status of this industry. It will, therefore, be unnecessary to occupy much space in any general remarks upon this subject. We will say however, that in many lines of goods American products can now fairly compete in quality with the best that can be imported, while in sewing silks and twists, we are considerably in advance. In dyeing, we are now pretty well skilled, with the exception of what is technically called "weighting," *i.e.*, the restoring, in the dyeing process, of the weight lost in the process called boiling, wherein all of the gum is washed away. In this, however, the manufacturer is the only loser, the consumer being a gainer; for, as the gum adds nothing to the strength of the silk, and as, also, weighting imparts no strength, and also, as silk is sold by the pound, it follows that the purchaser of American sewing silks and twists gets more yards, of equal strength, for his money, than he would obtain were the original weight of the silk restored in the coloring process. But this is not the only reason why American sewing silks and twists are superior, as will be seen further on, when we notice in detail the goods displayed.

The Nonotuck Silk Co., 28 Warren st., New York, exhibit one of the most beautiful cases on the floor, very tastily arranged. It shows the whole progress of the silk from the mulberry-tree leaf, upon which the worm feeds, to finished

SPOOL SEWING SILKS AND TWISTS.

The case contains various specimens of cocoons, raw silk from Japan, and TSATTLEE, a superior kind of silk imported from China. It is brought to this country in bales of 100 lbs., and its value is from nine to twelve dollars per pound. This firm, as well as others, in this country, manufacture sewing silks and twists from Tsattlee, and also, from other fine grades of silk. In Europe, these grades are made into dress goods, ribbons, etc., and inferior grades are employed for twists, etc.; a second reason for the superiority of American goods of this class. English manufacturers state that they would not get first cost for their goods, were they to employ the quality of stock used in America for this purpose. The Nonotuck Silk Co. show in their case a large variety of colors, all of which compare favorably with imported goods. It may be observed here, that a slight deficiency is admitted for American goods, in the aniline colors, but this can only be detected by experts, and in some dress goods shown here, even the most critical would be forced to admit that no foreign goods, of the same class, can excel the beauty of either their colors or textures. The goods of the company under consideration are equal, in this respect, to any goods of the same class exhibited, and, we are informed, they have, in their establishment, the oldest American silk dyer in the country, who has been in their employ thirty years.

The following incident well illustrates the progress of the manufacture of twists in the United States, and also shows how one improvement creates a demand for others.

Less than twenty years ago, I. M. Singer applied to the Nonotuck Silk Co., for a twist suitable for use on sewing machines, and, as an inducement for this company to commence its manufacture, ordered *five pounds*, enough to supply him for several months. This company held Mr. Singer's trade, thus initiated, till it amounted to *eighty thousand dollars per annum*. The value of machine twist now made in the United States, amounts to probably not less than a quarter of a million dollars, the demand having been entirely created by the sewing machine.

Geo. Comings, of New York, exhibits

SILK DRESS TRIMMINGS,

not a very extensive line, but praiseworthy in style and color.

B. Richardson, broker in raw silks, of New York, exhibits a great variety of

RAW SILKS, COCOONS, EGGS, ETC.,

from China, Japan, and Europe. This is a very interesting, and, to those unacquainted with the details of the business, an instructive display. The French and Italian silks are particularly beautiful. An important peculiarity of French and Italian silks is the uniformity of the thread; as in winding, great care is taken to wind from the same number of cocoons, and, whenever any one runs out, to replace it by another. This case is an important addition to the department, although it does not show the progress of the silk industry in the United States so much as the exhibitions of manufactured goods.

Cantrell and Chapin of Crestkill, N. J., exhibit

CANTON MACHINE TWIST,

a cheap variety of goods, but excellent of their kind; in our judgment, they are equal to any of the same class on exhibition. They are, for many kinds of work, as good as the more expensive kinds. Two cases are shown, one of which is arranged in quite a unique manner. It contains 3,500 spools, so placed that the name of the firm appears in prettily blended colors on a black background. This firm, also, manufacture Tram silks and organzines, for weaving, and are preparing to to enter upon the weaving of dress goods on

LYALL'S POSITIVE MOTION LOOMS,

one of which is now running on the floor, weaving dress silk, and attracting much attention. Its adaptation to this kind of work was minutely set forth in an illustrated description published on page 17, current volume of the SCIENTIFIC AMERICAN, to which we refer the reader. Another loom of this kind is also at work on goods *six yards and one quarter wide*, but a notice of which would be out of place here.

Werner, Itschner & Co., of Philadelphia, exhibit a small case of

RIBBONS,

which are, though commendable, scarcely equal to some exhibited by other establishments, yet to be noticed.

Horstmann Bros. & Co., of Philadelphia, exhibit a great variety of

UPHOLSTERY GOODS, REGALIA, CARRIAGE TRIMMINGS, MILITARY GOODS, AND LADIES' DRESS TRIMMINGS;

also, sashes, scarfs, and a great variety of other goods of their manufacture, all of excellent quality, and in a great variety of beautiful designs and colors. This firm have probably carried jacquard-loom weaving to a higher degree of perfection than any other American manufacturers, and the variety of the goods made by them is, we believe, the most extended of any American firm. We were much gratified, on a visit to Philadelphia, last winter, to witness the extent and systematic workings of their immense establishment, in which we spent considerable time, an interested spectator. The goods they exhibit are an honor to the firm and to the country, and they attract much attention from the visitor.

James S. S. Shapter, of New York, Secretary of the department, exhibits

DRESS SILKS,

beautiful in texture and color. We were gratified to witness the great progress which has been made in the manufacture of this kind of goods, as evidenced not only by this display, but also by other cases of goods exhibited.

The beautiful case of dress silks exhibited by P. G. Givernaud, of New Jersey, through his agents, Benkard & Hutton, of New York, can not be excelled by any goods ever imported. Both in texture and color they will be admitted by good judges to be first-class.

The same may be said of the splendid case of dress silks exhibited by Cheney Bros., of Hartford and Manchester, Conn., the leading silk manufacturers in the United States, who present a much larger variety of goods, forming one of the most attractive features of the Department. Their case contains, besides dress silks, ribbons, machine twist, poplins, Florentines, figured and plain, *gros grains*, extra fine organzine, buttonhole twist, etc., all of fine quality. It is a very rich display.

T. Baare, of Schoharie, N. Y., also exhibits a fine variety of dress silks, of good colors, and of undoubted good quality.

The Dale Manufacturing Company, in which the manufacture of dress silks has only quite recently been commenced, also exhibit a number of styles of dress silks, in connection with a large variety of

TAILORS' TRIMMINGS,

hat bands, and other narrow goods, to the manufacture of which their works are principally devoted. A full description of their mill was given on page 282, Vol. XIX., of this journal, to which the reader is referred. Their case, which is

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acknowledged to be the most elaborate in design of any on the floor, contains, also, a fine sample of buttonhole twist, with other samples, which render it one of the most attractive on exhibition.

The Oneida Community, of Oneida, N. Y., exhibit a fine case of machine twist, which is not only admired for its intrinsic merit, but for the superior manner in which it is spooled. It is quite evident the Community can "do some things as well as others."

Wm. Watson & Sons, of Paterson, N. J., exhibit Canton and

TSATTLEE TWIST,

which compares favorably with other goods of the same kind on exhibition.

The Excelsior Manufacturing Co., Paterson, N. J., exhibit first-class sewing silk and machine twist.

Dunlap & Malcolm, of Paterson exhibit a small case of machine twist, the colors of which are good.

Hamil & Booth, of Paterson, N. J. (Passaic silk works), exhibit a beautiful selection of sewing silks, machine twist

EMBROIDERY SILKS

tram, organzine, and fringe silks, both colored and in gum, a display which ranks among the best in the department.

INCIDENTAL

to the display in this department is a small case by J. W. Gregory, of New York, containing raw fiber, and plain and colored textures made of the celebrated

RAMIE FIBER,

which will attract much attention from those interested in the introduction and growth of the Ramie plant in the United States. The textures seem very fine and soft, but it is evident from these samples that the art of dyeing them is yet imperfectly understood. They show very poorly in contrast with the brilliant colored silks in the department.

Another small case, by Bernstein & Mack, of New York, contains a

MODEL MACHINE FOR THE MANUFACTURE OF CHENILLE,

with some samples of this class of goods which are pretty.

The progress made in this industry since the former exhibition of the American Institute, is perhaps as marked as in any other department of the fair. This progress has been made against many great difficulties, and exhibits the enterprise and energy of American manufacturers in the most favorable light.

The present tariff is fast building up this industry, and if continued, will not only extend but permanently establish it; and the production of raw silk, already very successful in some sections, may be made to add largely to the present resources of the country. California will, eventually, not only become the vineyard of North America, but, in connection with certain parts of the Southern States, become, so far as the growing of silk is concerned, the Italy of this continent.

From the silk department we will ask the reader to accompany us into the

DEPARTMENT OF THE DWELLING

which comprises apparatus for warming, lighting, cooling, and ventilating, cooking stoves, kitchen utensils, carpets, oilcloths, tapestry, cabinet furniture, table furniture, ornaments for parlors, building accessories, mantels, grates, etc. Carpets are exhibited principally in the woolen department, noticed in our last, and we shall not here allude further to them. The class of

TABLE FURNITURE

comprises a large variety of pressed and cut glass ware, plated goods, cutlery, etc., which we must pass, for the present at least without detailed notice. We will, however, state that the class is finely represented and the wares are finely designed, and some of them very artistic, making a display very creditable to the manufacturers whose goods are displayed.

One of the most extensive classes in this department is that of

STOVES, RANGES, HOT-AIR FURNACES, AND OTHER HEATING APPARATUS,

the most striking of which is the Empire Range, exhibited by Moncuse & L. Duparqnet, of New York. It is a magnificent piece of workmanship, twenty-four feet long by six in width, and capable of being extended to any desirable length by putting in sections. It is one of the most complete ranges we have ever seen, provided with an electro-motor engine for turning the spits and all sizes of vessels for the performance of culinary operations. A complete dinner for a regiment might be prepared on it.

Among the manufacturers who have praiseworthy goods of this class on exhibition, we notice W. C. Lesster, of New York; Hull Grippen & Co., New York; John Q. A. Butler, New York; H. G. Giles & Son, of New York; Burtis & Rice, New York; Barry & Lane, New York; J. W. Lane & Co., New York. The fact that the exhibitors in this class are principally from New York, does not perhaps derogate from the representative character of the display, as the wares are fair samples of wares of this kind made throughout the country. The furnaces and ranges of Barry & Lane, of New York, and the New Portable Furnace exhibited by J. W. Lane & Co., of New York, are specially commendable.

Next to heating apparatus in importance ranks lighting apparatus. In this class we find a few machines for the production of a

DOMESTIC GAS LIGHT,

among which appears the apparatus of C. F. Dunderdale, of New York, illustrated and described on page 164, current volume of the Scientific American, to which the reader is referred. The Domestic Gas-light Works exhibited by J. T. & R. H. Plass, of New York, is an apparatus for charging air with the vapor of the light hydrocarbon oils. The Patent Vapor Stove, House-lamp, and Gas Light, exhibited by D. H. Lowe, of New York, are pieces of apparatus which generate gas from similar liquids for purposes indicated sufficiently by the names of the articles. The most unique of these devices is, however, Gardiner's apparatus for turning on and off, and lighting gas by electricity. This apparatus is, however, intended for lighting the public gas lamps of cities, as well as for use in hotels and private dwellings. The inventor thus describes its application to this purpose: At the Station House may be placed a key-board, and in connection with each key is an indicator, which corresponds with the indicators of the electro-magnetic stop-cocks, which are placed in each lamp post. When the operator wishes to light any street or district, he presses the key, which moves the indicator in the office; at the same moment all the stop-cocks in that district, or street, move according to the indicator at the office. The operator has perfect control of all the public lamps in the city, as he can light any district or street he wishes without interfering with any other portion of the city, and can turn off the gas by the same movement of the keys, as he knows by his indicators when the gas is turned off or on.

Mitchell Vance & Co., of New York, exhibit a fine assortment of

CHANDELIERS AND GAS FIXTURES, GILT AND MARBLE CLOCKS AND BRONZES,

which make a fine display, many of the designs being very artistic indeed. The alcove containing this collection is arranged in an elegant manner, and attracts much attention.

In the department of

FURNITURE

there are some beautiful articles exhibited, many of which are, in the words of Goldsmith—

> . . . contrived a double debt to pay,
> A bed by night, a chest of drawers by day.

Among the most beautiful pieces of furniture thus adapted to various uses is the Multiple and Dividing Table, exhibited by Dronhard & Roye, of New York. It is elaborately and beautifully inlaid, the material of which it is constructed being principally ebony. By releasing two small hooks, the table divides longitudinally in halves, the tops of each half spreads out, and two library or card tables are formed with green cloth tops, which replace the inlaid design previously visible. By closing the tops each half becomes a beautiful consol, which may be wheeled against the wall of an apartment, and is as chaste and beautiful in design as the original table. This is a *chef d'œuvre* of workmanship.

M. Sulzbachcher, of New York, exhibits a very attractive piece of furniture, which is by day not merely a chest of drawers, but an elegant cabinet with secret compartments for papers and valuables, shelving for books and papers, etc., etc. The lower part, however, contains a very nice spring bed all complete, but so snugly folded and tucked away that not the slightest suspicion of its existence would enter the mind of the spectator were it not displayed by the attendant. This is also a paragon of fine workmanship, and excites much admiration.

Another bedstead exhibited by Pullman & Bro., of New York, by day simulates—we must confess rather poorly—a bookcase.

Dexter Howe, of New York, exhibits a new kind of rocking chair, which is very comfortable to recline in, and which has no projecting rockers to encumber the room and destroy other furniture; is easy and regular in its motion; does not wear the carpet; is not affected by the uneven surface of a floor; applicable to any style of chair, and symmetrical in appearance. The improvement seems really a good one, and is attracting much notice.

In the display of

WATER FIXTURES

we find some familiar but excellent things.

Wm. S. Carr & Co., of New York, exhibit their excellent new Monitor Pan Water Closet, probably one of the very best things of the kind now made anywhere.

John Keane & Co., of New York, exhibit what they call a "Patent Extractor and Hydro-Valve," designed for house and ship water-closets, intended to obviate all necessity of care in attendants, and to keep itself clean and cut off all foul gases.

The Colwells Shaw and Willard Manufacturing Co. exhibit their

PATENT LEAD-INCASED BLOCK-TIN PIPE,

with a new improvement, obviating all objections hitherto made by plumbers as to the difficulty in making joints in such pipes. Our readers are already aware that we hold this pipe in high estimation, from numerous allusions to the improvement which have been made in these pages.

Among

ARCHITECTURAL IMPROVEMENTS

we notice iron skylights, ventilators, etc., etc., exhibited by the Hudson River Iron Works, of New York, whose work in this line is of superior quality.

Also Perkins' Patent Fire-proof Window Shutter, exhibited by H. O. Baker, of New York, which is also well constructed to subserve the purpose designed.

Some specimens of

STEAM-MACHINE CARVING,

shown by A. Henkel & Co., of New York, are really very remarkable in execution. Heads, figures, *bas reliefs*, etc., are exhibited, and are well worthy of particular notice.

Specimens of

NATURAL WOOD PRINTING,

where an exact transcription of the figure formed by the grain of wood, is made upon paper hangings, are shown by the New York Wood Company, of New York. The process by which this is accomplished has already been described in these columns. The hangings produced exactly resemble veneers cut from oak, walnut, or other wood.

P. H. Schaad, of New York, exhibits a most chaste and beautiful

MARBLE MANTEL,

after an original design, which elicits general admiration.

The Penrhyn Slate Company exhibit several specimens of their

ENAMELED SLATE MANTELS,

table-tops, etc., which are also rich in design and finish.

Among

LAUNDRY MACHINERY

there are a great many styles of washing machines and mangles. Some of very large size, to be driven by steam power, are shown by the New York Laundry Manufacturing Company, capable of doing an enormous amount of work in a very short time. These machines are running by power supplied by the Institute, and attract much observation. There are other machines intended for power on the floor, but none in operation. We find in this department also a large display of clothes wringers, meat-chopping machines, and a host of all kinds of implements and improvements designed to lessen the work of the dwelling, and add to the comfort of mankind.

A very large number of

MINOR IMPROVEMENTS

and articles are shown, a mere list of which would be too large for our space. Anything from a patent carpet tack to a washing machine may be met with here, and we shall notice only a very few of these efforts of real Yankee genius.

The

BURGLAR ALARM TELEGRAPH,

exhibited by E. Holmes, of New York, attracts universal attention. It is connected with all the windows of the building, and greatly adds to the security of the costly articles on exhibition. It is, in the language of the inventor, "A watchman that has but one house to protect, is always on the spot, never goes to sleep, cannot be bought off, and an experience of eight years without a failure proves that it is perfectly reliable and satisfactory."

No department of the exhibition exhibits the value of small inventions, and the interest taken in them by the public, more than this, which, at the time of our visit, attracted more spectators than any other, except the department of machinery.

THE ONE NEEDLE FAMILY KNITTER.

The first page of the present volume bore an illustration and description of Hinkley's one-needle family knitting machine. The terms in which we spoke of this ingenious and simple device were received in some quarters with skepticism, but we had full confidence that the future history of the machine would demonstrate the soundness of our judgment in regard to its merits.

We styled it a "family knitter" from the conviction that the simplicity of its parts and the ease with which it can be operated, as well as the rapidity with which the necessary manipulations can be learned, would enable even children of twelve or fourteen years to operate it satisfactorily. We were, however, somewhat astonished on the evening of the 24th Sept., upon a visit to the Exhibition of the American Institute, to see a child of only seven years operating the machine with skill and apparent ease. Upon inquiry we ascertained that the name of this little worker, around whom a large and admiring crowd had gathered, was Miss Alice Hall, daughter of Thomas Hall, Esq., of Brooklyn, New York.

This exceeded any opinion we had formed of the general utility of this knitting maching in the household, but when Miss Alice made her bow, and her younger sister, Florence, only *four* years old, took her place at the machine, we, in common with the crowd of lookers-on, could hardly refrain from some enthusiasm. Back and forth went the machine under the deft management of those little fingers, and still the wonder grew as well as the texture.

Several prominent gentlemen of the press were present, and all agreed that this episode in the routine of the Fair must greatly strengthen the favor with which the public are now regarding this invention.

The machine is exhibited by the Hinkley Knitting Machine Co., No. 176 Broadway, of which Mr. A. G. Page is the president, who has received a great many testimonials respecting its merits, and the demand for it is constantly increasing.

We presume no one visiting the fair will fail to examine it for themselves, as it certainly is one of the chief attractions of the department in which it is displayed.

The knitter is about the size and weight of a Wheeler & Wilson sewing machine, and unlike any other knitting machine is operated equally well by the foot or the hand. The price of the machine is so small that it is within the reach of those in the narrowest circumstances, while its adaptability to ornamental work renders it a most desirable addition to the fancy work tables of the wealthy.

Electric Beacons.—Thomas Stevenson, C. E., Edinburgh, recently conducted an experiment at Granton, with the view of showing the practicability of illuminating beacons and buoys at sea with the electric light, produced by means of a battery on shore. A submarine cable, fully half a mile in length, was laid between the east breakwater of Granton Harbor and the chair pier at Trinity. The operator occupied a station near the center of the breakwater, and the light was shown at the point of the pier in front of an ordinary lighthouse reflector, producing a most brilliant flash. The flashes were emitted with great rapidity; as many as 500 can be transmitted in a minute, but the machine can be regulated so as to send one every second, or at any other desired interval. The experiment gave entire satisfaction.

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OMISSION OF OATH UNDER SEC. 6. ACT OF 1836---FRAUD IN OBTAINING THE EXTENSION---THIRD PARTIES CANNOT TAKE ADVANTAGE OF SAME---LAW OF COMBINATIONS---WHAT WILL INFRINGE A COMBINATION CLAIM.

We give below the most valuable portions of a decision lately made by Judge Clark in the New Hampshire District, in the suit in equity, George Crompton *vs.* The Belknap Mills *et al.*

The respondent objects to the Marshall Patent of December 11, 1849, that the invention was neither new nor useful, and that the patentee did not, before the granting and issuing of the letters to him, take the oath prescribed by section 6th, of the act of July 4, 1836, that he verily believed he was the original inventor or discoverer of the art, machine, etc., for which he solicited a patent.

A Patent is deemed *prima facie* evidence that the patentee has made the invention. There is, in this case, no sufficient evidence to overcome that presumption, or *prima facie* case.

There is evidence that "open-shed" fancy looms were used prior to Marshall's invention, but not involving the combination of Marshall. His invention must, therefore, be taken to be new. Precisely how useful it may be, the court have not undertaken to decide; but that it is sufficiently so to support a patent, we have no doubt. Other loomsmay have been preferred by different persons, or may have found a readier sale; but that good cloth can be woven by Marshall's loom and invention there is sufficient evidence.

To warrant a patent, the invention must be useful—that is, capable of some beneficial use, in contradistinction to what is pernicious, or frivolous, or worthless. These objections to the patent cannot therefore avail. Nor can the other, that the oath required by the 6th section of the act of 1836 was not taken, for two reasons.

1st. We are not satisfied the oath was not taken. The letters patent recite that it was. The respondent finds, among the papers on file in the case in the Patent Office, a blank form of the oath, with the jurat not signed by any magistrate, and hence he argues the oath was not taken. But the oath may have been taken for all that; and this negative testimony cannot overcome the direct recital of the letters patent that the oath was taken; or the presumption that the requirements of the law were complied with in issuing the patent. But suppose it were so. Suppose the oath was not taken, would the patent be void on that account? It was held otherwise by Justice Story in the case of Whittemore *vs.* Cutter, 1 Gal., 429. The taking of the oath, though to be done prior to the granting of the patent, is not a condition precedent, failing which the patent must fail. It is the evidence required to be furnished to the Patent Office, that the applicant verily believes he is the original and first inventor of the art, etc. If he take this oath, and it turns out that he was not the first inventor or discoverer, his patent must fail, is void. So, if he do not take it, and still he is the first inventor or discoverer, the patent will be supported. It is *prima facie* evidence of the novelty and originality of the invention until the contrary appear.

So the act says, on payment of the duty—that is, fees—the commissioner shall make an examination, and, if the invention shall be found useful and important, shall issue a patent. Suppose the fees should not be required or paid, would the patent therefore be void? Yet the one requirement appears to be as much a condition precedent as the other. Both directory, not to be dispensed with; but neither involving the validity of the patent when granted.

The next objections are to the reissued patent, and they are two. 1st. That the original patent was void, and the reissue was therefore so; and 2d. That the reissue was not for the same invention as the original.

The first of these objections has already been disposed of. It was maintained in the argument, that the original patent was void for want of the proper oath, and that the defect could not be cured by the reissue. But, whether the oath were taken or not, we are of the opinion, as already expressed, that such an omission would not invalidate the patent, nor would it affect the reissue. The second objection to the reissue is a more serious one, and for its proper determination requires a careful examination and comparison of the original patent to Marshall, and the reissue to Crompton.

We think that substantially the same invention is described in the two patents.

But if it should be held that the original patent to Marshall, and the reissue to Crompton, assignee, were valid, it is contended that the extension to Marshall, was not, for three reasons, to wit:

1. That as Marshall never had any interest in the reissued patent, it could not be extended to him.
2. That no sufficient notice was given to the public of the application for the extension of the patent; and
3. That the extension was obtained by fraud.

To the first objection, to wit, "that as Marshall never had any interest in the reissued patent, it could not be extended to him," it is a full answer, that, in judgment of law, the reissue is only a continuation of the original patent. So held in Read *vs.* Bowman, 2 Wallace, 604; and as Marshall was the original patentee, the extension was legally and properly to him. The extension enuring, under the statute, to the assignees and grantees to the extent of their respective interests.

The second objection is that there was no notice ever ordered, or given of any application to extend the reissued patent. There was of the application to extend the original patent, and the objection stands upon the supposition, or idea, that they are two distinct patents, while in judgment of law they are one. If the reissue was only a continuation of the original patent, then a notice to extend the original would seem to have been sufficient.

Again, under the act of 1836, the Secretary of State, the Commissioner of Patents, and the Solicitor of the Treasury were a board of commissioners to "hear and decide upon the evidence produced before them, both for and against the extension." It has been held that the functions of this board were judicial, and that their judgment settled conclusively all questions of notice.

The statute of May 27, 1848, 9 Statutes at Large, 231, section 1, provided that the power to extend patents then vested in the board of commissioners "Should be vested solely in the Commissioner of Patents; and in Clum *vs.* Brewer, 2 Curtis, 506, it was held, that the act of the commissioner in extending a patent was conclusive of the facts, which he is required to find, in order to grant such extension, in the absence of fraud or excess of jurisdiction. But here, third, it is said, that the extension was procured by fraud. We do not, however, think this objection is open to this respondent. He stands before the court, accused of infringing the complainant's patent. He may, undoubtedly, show that the invention claimed by the complainant was not new, or useful, or that it had been dedicated to the public, Or that there was no sufficient specification or description, and so that there was in fact no infringement for which he should answer, but we think he cannot attack the granting and validity of the patent in this collateral manner.

If there was fraud practiced in obtaining the patent, that is a matter between the Patent Office and the patentee; and can, perhaps, be inquired into by some proper proceeding of the officers of the Government to vacate the patent. But in this particular, like a judgment, it must be respected and enforced, until reversed or annulled by some proceedings directly for that purpose. It is not exposed to the attacks of strangers or third persons for such reason.

The question then is, whether the Thomas loom, as it is called, infringes the Marshall patent as reissued and extended? The original patent to Marshall, December 11, 1849, claimed the movable spring rests to hold the jacks of the harness, and the "evener," and the combination of the rotating, lifting, and depressing bars, so as to revolve, etc. As reissued to Crompton, the claim was for combining with the jacks and with the lifter and depresser and pattern chain, or any equivalent mechanism for determining the pattern, a mechanism for holding the jacks either in their elevated or depressed position when not required to be operated, substantially and for the purpose specified.

The language is "a mechanism for holding the jacks." This is broad enough, upon its face, to cover any mechanism, and if it stood alone and unaided it would be so general and uncertain as to be entirely void, but in the specification the holding mechanism is described particularly and precisely, and the claim is limited by such specification. Here, then, are combined five elements, to wit: the jacks, the lifter and depresser, the pattern chain, and the holding mechanism; and any machine combining, substantially in the same manner, substantially the same elements, or well-known substitutes for the same, must be regarded as an infringement of this reissued patent. But it would not be infringed by a combination which dispensed with one of the elements and substituted therefor another element, substantially different in construction and operation, but serving the same purpose; nor by any and every combination of the same elements, which may produce the same result, but only by the peculiar combination of the elements described, or one substantially the same.

The elements here combined are old, the patent is for the peculiar combination, and the doctrine of mechanical equivalents does not apply.

The identity or diversity of two machines depends, not on the employment of the same elements or powers of mechanics, but upon producing the given effect by substantially the same mode of operation, or substantially the same combination of powers.

Following these principles and adjudications, we proceed to the examination and comparison of the Marshall and the Thomas looms. In both we find, substantially, the same jacks, differing in form, but performing, substantially, the same office. In both we find, substantially, the same elevator and depresser; arranged in the Marshall loom in a rotating, endless chain, so that the same bar in going up is an elevator, but in rotation or revolution, going down, becomes a depresser.

These three elements are substantially the same, but when we come to the holding mechanism we find a marked and substantial difference in the two machines. In the argument of the respondent's counsel, it was contended, that the holding mechanism of the Marshall loom was not only the "series of horizontal spring latches, or catches," and the shoulders on the two prongs of the jacks, but that it included the connecting mechanism of the jacks with the heddle lever, the pattern mechanism, and the "evener." Now, although it be true that the connecting mechanism and pattern mechanism of the jacks hold the jacks securely upon the spring latches, as upon a seat, until they be forced or allowed to come off by the pattern mechanism, and although in the operation of the machine there is a point of time after the jacks are forced off the springs, when the heddle levers are firmly held by the evener, so that the jacks cannot move, nor the sheds close, until allowed to do so by the removal of the evener, yet we have considered the holding mechanism to be as described in the patent, to wit, the series of horizontal spring latches or catches, and the notches on the prongs of the jacks, and still we find the holding mechanism of the two machines to be substantially different.

In the Marshall machine, the elevator carries upward a particular jack, the beveled face on the projecting notch on the prong of the jack meets the beveled face of the spring, presses it back, and passes it. Then the spring flies out under the shoulder of the jack and the jack rests upon it, in a manner similar to a window sash raised and resting on the old and familiar window spring. Here it sits or is held until the pattern mechanism forces it off the spring and allows it to descend. When a jack is carried down by the depresser, it is held by a similar spring; being kept on its seat by the pattern mechanism, until allowed to be drawn off by the oblique connecting mechanism.

Now in the Thomas loom there is a very different mechanism or device. There is a jack which is carried up and down by an elevator and depresser. On one side of this jack there is a gearing connecting it with and operating sector. As the jack goes up and down, it rolls or rocks this sector forward and backward as if you should turn a wheel part of the way round, say one fourth, and then bring it back again, and so continue.

In or near this circumference of this sector, there is a cam groove, and playing in this cam groove, forward and backward, as the sector moves, a projecting stud or friction roller connected with an arm of the heddle lever. This heddle lever rocks upon its fulcrum, and as, the arm, guided and controlled by the projecting stud in the cam groove, is carried upward or downward by the cam groove, the ends of the rocking heddle lever are carried backwards and forwards, elevating or depressing, or holding stationary the harnesses. In the one end of the cam groove is a conce tric into which the projecting stud or roller falls, which it is contended by thecomplainant's counsel is a substitute for the spring latch or catch of the Marshall loom; but we are of the opinion it is not so; but that the whole cam groove, of which the concentric makes a part, is more correctly a substitute for the cam; and that this device of the Thomas loom much more resembles in principle and operation the old Middlesex cam loom than it does the Marshall loom. It cannot be conceded that the Marshall and the Thomas holding devices are the same, because the operation in both cases is performed by a surface of metal passing under or over another surface, and that therefore one infringes the other. In the old Middlesex cam loom one surface passed over another, to wit, over the cam, and was elevated, depressed, or held stationary by it; yet it was very different from the Marshall device. We cannot give the Marshall holding device any such latitude of construction.

There is also in the Thomas loom a brake connected and operating upon the periphery of the sector, retarding, regulating, and governing its motion. And whether we regard this brake as a part of the holding mechanism or not, we think and conclude that these two elements are substantially different, and that one is not a well-known substitute for the other.

We now come to the last element or device, to wit, the pattern mechanism. Had the pattern to Marshall not been surrendered, and a new one issued, the question of infringement, if it arose at all, must have arisen between the holding mechanism of the two looms; but that patent having been surrendered, and a new one issued, claiming a combination of elements, that new one is liable to be avoided, by showing that the Thomas loom uses a substantially different element from any one of those combined.

To return to the pattern devices. These two mechanisms or devices are very different in their construction and in their operation. H. B. Renwick, one of the complainant's experts, says: "I think the pattern chain in model B" (the Thomas loom) "is, considered by itself, a substantially different species of pattern chain from that specially described and represented in the drawing of the Marshall reissue, and differing from it in the fact that it requires motion in two directions in order to cause it to operate upon the jacks, while the chain represented in the drawings of Marshall requires motion only in one direction." Precisely in the sense mentioned by this expert we are now considering these two devices or mechanisms, that is, by themselves; and in that view they are substantially different, in principle, construction, and operation. But if we consider them in regard to the functions they perform, we shall find as great and substantial difference. Both select the jacks to be operated, but the pattern chain, in addition to this, in the Marshall loom, forces the jacks off the upper series of spring catches, and holds them on to the lower series, in both instances in opposition to the force supplied by the oblique connection of the jacks with the heddle levers. Both these devices are said to be old. That is true in a limited sense. The Marshall chain is old. The Thomas mechanism is old in the fundamental principle. It is that of the Jacquard pattern; but Thomas has made two improvements upon it, which are not old. They are also said to be well-known substitutes for one another; but it is very evident, both from the testimony of the experts, and an examination of the machines, that, though the Marshall pattern mechanism might be applied to the Thomas loom, there is no apparent practical mode of applying the Thomas pattern mechanism to the Marshall loom, with its present method of holding the jacks. Can one device be said to be a well-known substitute for another which cannot be used for it? Thus much for the elements of the Marshall combination. We now pass to the combination itself. Is the combination in the two machines substantially the same? It may be said they cannot be, if the elements are not the same, as gold and copper is not the same combination as silver and copper. But the inquiry is to another point. Is the method or manner of the combination the same? We think not. Indeed, there seems to be as wide and substantial a difference in the mode of combination as in the things combined. Take, for instance, the combination of the jacks with the holding mechanism in the Marshall loom. By the lengthening of the lower heddle lever, giving an oblique direction to the connection of the jacks with the upper lever and lower, the protuberances upon the prongs of the jacks are held upon the upper series of spring catches. There is no such connection, device, office performed, or combination that we can discover in the Thomas loom.

Again, take the combination of the pattern mechanism in the Marshall loom with the jacks. It is so arranged as to hold the protuberances of the jack upon the lower series of spring catches, there performing substantially the same office that the oblique connection of the jacks with the heddle levers does in regard to the upper catches. There is nothing like this in the Thomas loom.

Again, take the combination of the holding mechanism, with the pattern mechanism and jacks, and there we find a substantially different combination, or mode of combination, in the two looms. In the Marshall loom the jacks are combined with the holding catches, by their oblique connection with the heddle levers, keeping the jacks seated upon the upper catches, until forced off by the pattern cams, and pulling the jacks off the lower catches when not held on by the cams. Is there any such arrangement in the Thomas loom? We do not find it, nor anything nearly approaching it. In the Thomas loom the jack is connected with the rocking sector by a gearing, rocking the sector backwards and forwards as the jack goes up and down. In the circumference of this sector is a cam groove, or slot; in this groove plays a stud or friction wheel attached to an arm of the heddle lever.

This stud is guided and held by the cam slot, thus elevating, depressing, or holding the heddle lever as it comes into one or the other part of the slot. The pattern mechanism has nothing whatever to do with this holding, elevating, or depressing, further than to select the particular jack. We leave out of this combination the brake purposely, though that device in the Thomas loom, and the "evener" in the Marshall, play very important parts, both in holding the shed open, and in preventing its closing too quickly.

We might pursue this examination and comparison further, but have gone far enough to warrant the conclusion to which we have come, that the respondents have not infringed the complainant's reissued patent. To constitute an infringement of a patent for a combination, the defendant must have used the same combination, constructed and operated substantially in the same way.

A patent for a combination is not infringed unless all the essential parts of it are substantially imitated. The patentee of a combination cannot treat another as infringer, who has improved the original machine, by the use of a substantially different combination, though it produce the same result.

A patent for a combination of three distinct things is not infringed by combining two of them with a third, which is substantially different from the third element described in the specification.

In Morris *vs.* Barrett, 1 Fish, 461, it was held, that in an action for an infringement, the machines themselves, as shown by the models, were evidence entitled to the highest credit.

We have examined the models in this case very carefully and repeatedly: and they have very materially aided us in coming to a satisfactory conclusion; particularly in determining how much weight was to be given to the opinions and explanations of the experts, two of which appeared on each side, swearing with equal confidence and apparent intelligence in opposite directions.

The complainant's bill must be dismissed with cost.

B. R. CURTIS & CAUSTEN BROWNE, for Complainant.
T. A. JENCKES & JOSHUA D. BALL, for Defendants.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The first annual fair of the Lake Shore Grape Growers' Association will be held at Erie on Friday and Saturday, October 15 and 16.

The Titusville *Herald* says that the petroleum production for August was considerably increased by the opening of the new wells.

The Central Park Commissioners have defined the lines and filed the maps for the widening of Broadway from Thirty-second street to Fifty-ninth street.

The mean rate of discharge of the Mississippi into the Gulf of Mexico is upwards of thirty-eight million six hundred thousand pounds of water per second.

A new granite quarry has been opened in Jamesport, Washington county, Maine. The stone has a beautiful pink color, which, if durable, will render the stone very valuable for building purposes.

Twenty-two States were represented at the meeting of the American Pomological Society, at Philadelphia. The exhibition of fruit was very attractive and comprised a great number of specimens.

About 100 feet of embankment of the Erie Canal at Pool's Brook, near Kirkville, were carried out on the 21st of September, and the flood covered the Central Railroad track, temporarily suspending travel. One track is now in use. It will require several days to repair the break.

A huge chimney has been completed at the Earl of Dudley's estate at Coneygre Works, near Dudley, England. Special arrangements for the consumption of fuel necessitated the carrying of the stack to a hight of 190 feet. It is strengthened by iron-work for a distance of 100 feet above the ground.

The Croton Water Works in process of erection at High Bridge are now well advanced, and by next spring the inhabitants of Washington Hights are promised all the water they want. The reservoir is nearly completed, requiring only some grading of its banks, coping, and further work on the western gate.

Herr Krupp must look to his laurels. A larger block of steel than has ever issued from his works is now in progress of casting at Osnabruck. It weighs 200 tuns, whereas the block with which Krupp astonished the world at the Great Exhibition of 1862 weighed only twenty, but he has surpassed this feat in later years.

Dr. Koller recommends concentrated glycerin as a substitute for spirits of wine for the preservation of zoological and anatomical preparations, on the ground that it is not liable to evaporation, that it is not combustible, and that moreover, it preserves better the natural color of various preparations usually kept and preserved in spirits of wine.

The contractor for the erection of the railroad bridge over the Missouri river, which is intended to connect the Missouri and Iowa railroads directly with the Union Pacific is said to have received notice from the Irish laborers of that locality that he will not be allowed to employ Chinamen on the work. He has, nevertheless, made contracts in California to obtain Chinese laborers, and he intends to bring them to Omaha soon. It is very probable that we shall soon hear of some fighting.

M. Pollack, of Boutzen, Saxony, states that he has used for several years, a paste made of pure oxide of lead, litharge, and concentrated glycerin, as a cement to fasten stone to stone, and iron to iron. This mixture hardens rapidly, is insoluble in acids (unless quite concentrated), and is not affected by heat. He used it successfully in joining different portions of a fly wheel; and when used as a cement for stone, it was found easier to break the stone than effect a separation at the joint.

As a new method of fusing difficultly decomposable minerals, it is recommended that 1 part of the mineral, previously very finely powdered, should be mixed with 3 parts of fluoride of sodium, and that this mixture, after having been placed in a platinum crucible, should be covered with 12 parts of powdered bisulphate of potassa. Chrome iron ore, hard hematite, tin ores, and rutile corundum, and the like, are very readily brought to fusion and disintegrated by this flux, even with no more heat than that obtained by a good Bunsen gas-burner.

The *Shipping and Commercial List*, of New York, in alluding to the amounts paid to passengers by the different railroad companies as compensation for damages, says that probably not one of all the accidents which inflicted the injuries that had to be paid for was the result of a natural cause. Most of them were attributed by the verdict of the coroners' juries to broken rails or the carelessness of employés. Experts have declared that accidents from broken rails would be practically done away with, were the rails made in two or three continuous parts, and the expense of this in the manufacture could not be great.

In the year 1868 there were 3,991 applications for letters patent filed in the British Patent Office. The stamp duties received in respect of patents amounted to 119,271 pounds. After deducting expenditure, there is a considerable yearly surplus income; and the aggregate surplus from 1852 to the end of last year exceeds 726,000 pounds. The Commissioners complain of the insufficiency of the building for the requirements of the office. Complete sets of the Commissioners of Patents' publications—each set including more than 2,500 volumes—have been presented to the most important towns in the kingdom, to be accessible to the public free of charge.

M. Reinsch, having experimented with various salts in order to determine which was best suited to prevent timber bursting into flame has come to the conclusion that impregnating timber with a strong solution of rock salt is as good (if not a better) preservative against its bursting into flame, as water-glass (silicate of soda). Bock salt costs much less than water-glass, and it has also the effect of keeping the timber free from dry-rot and noxious insects. He also says that the use of a solution of salt in extinguishing a fire with fire-engines would be very effective, but it is questionable whether the engines would not soon become worthless from the effect of the salt.

The recent terrible coal-mine accident at Avondale, says the Easton *Free Press*, calls to mind a former great accident in Pennsylvania mines, which occurred in Carbondale in 1850. A large mine caved in, destroying over a hundred lives, and ruining the mine. When the cave-in occurred the pressure of air from the falling mass was so great that it blew a boy and a mule an eighth of a mile out of the narrow entrance to the mine. A few of those entombed worked their way out through all the dangers of fire-damp and foul air, but the most of them perished by starvation, or fell a prey to the rats, which in coal-mines grow to an enormous size. One man was seven days in digging his way to the surface.

A bituminous composition, which may be used in the shape of bricks or as a coating on any desired foundation, has been invented, and is said to be suitable for the bottoms of reservoirs, for pavements of streets and terraces, and many other applications. It is composed of the following ingredients in the proportions stated: For every 100 pounds weight of bitumen—sulphur, 37½ lbs; galipot (or in case of necessity colophony), 25 lbs; lamp-black, 12½ lbs; sand, 25 lbs = 100 lbs. For bitumen to be applied on wood the quantity of sand may be reduced by about 5 lbs weight, and it is preferable that the wood be rough. In preparing this bitumen the sulphur must first be thoroughly melted in a sheet iron caldron or in an earthenware pot; the galipot is then added, and when this is almost entirely melted the lampblack is introduced, and, lastly, the sand. The whole is carefully mixed over a moderate fire.

A charcoal flower-pot has been patented in England. The charcoal is molded into the approved form in such a manner that its peculiar porosity may be in no way interfered with. By this means, not only is the oxygen of the air allowed free access to the soil within the flower-pot, but the water with which the soil is moistened is, by the filtering and purifying powers of the carbon, deprived of all those "hard" qualities which are known to be so deleterious to the growth of plants. Further, the sulphurous vapors, which are usually present in the atmosphere of large towns and constitute the principal reason why floriculture is attended with so much difficulty in all cities heated with coal and lighted with gas, are, by the use of the charcoal flower-pot, fixed in the pores of the carbonaceous sponge. Hence, not only are pure air and pure water insured to the plant; but, all noxious vapors being removed, it follows that a healthy and vigorous growth and luxuriant development cannot but ensue.

NEW PUBLICATIONS.

MAN IN GENESIS AND GEOLOGY; or, the Biblical Account of Man's Creation, Tested by Scientific Theories of his Origin and Antiquity. By Joseph P. Thompson, D.D., LL.D. New York: Samuel R. Wells, Publisher, 389 Broadway.

The kind of discussion contained in this book is of very little interest to us, and we regard it as of very little value to the world. The statement made in the first paragraph of the preface begs every disputed question at the very threshold of the book. This statement is in the words of the author as follows: "No fact declared by science can be accepted as true if it conflicts with any statement of the Bible." That an author starting with such a proposition could ever arrive at truth is morally impossible. Therefore it is not surprising that the book instead of being a candid research after truth, is a weak attempt to make all known facts coincide with the writer's interpretation of the Scriptures. Not that the facts of science necessarily conflict with the Mosaic record. All we can say is, that in some cases they *seem* to conflict with *our* understanding of that record. But to start out properly in a search for truth, one must divest his mind of preconceived notions—a standard of candor to which the author of this book has been evidently unable to attain.

THE METALLURGY OF IRON AND STEEL, Theoretical and Practical, in all its Branches, with Special Reference to American Materials and Processes. By H. S. Osborn, LL.D., Professor of Mining and Metallurgy in Lafayette College, Easton, Pa. Illustrated by 230 Engravings on Wood, and 6 Folding Plates. Philadelphia: Henry Carey Baird, Industrial Publisher, 406 Walnut street. London: Trubner & Co.

This is a voluminous and exhaustive treatise, rivaling in extent the celebrated work of Crookes and Röhrig on the same subject, but having, as stated in the title, more especial reference to American materials and processes. We will give a review of this important work as soon as we have time to give it the examination it merits.

WE are also in receipt of the Annual Report of the State Engineer and and Surveyor on the Canals of New York, for the Year 1868, and also the State Engineer's Report on Railroads for the same year; able documents containing much information, abstracts of which we will lay before our readers in due time

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Facts for the Ladies.

This is to certify that I bought a Wheeler & Wilson Sewing Machine, March 7, 1859, and it has been used with entire satisfaction by my daughter, who was afflicted with spine disease. It proved the best doctor I ever employed, for she not only regained her health, but has earned a living with it for herself and me ever since. Mrs. M. B. Ball.

New York, Nov. 29, 1868.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Wanted by a business man—The agency, in Portland, of some useful invention. Address J. W. Lucas, Portland, Me.

Metallic Letters to put on Patterns; also, for numbering street doors and church pews. Allen & Brim, Seneca Falls, N. Y.

Lubricator for loose pulleys, in general use. Satisfaction guaranteed. The patent for sale. Address Box 31, 648 Broadway, New York.

Wanted.—Builders of Hoisting Machinery, suitable for a five-story factory, to send their descriptive circulars and price lists to S. N. Brown & Co., Dayton, Ohio.

The great scarcity of water in our large cities is mainly caused by the enormous quantity wasted, which can be prevented by using the Boston Safety Faucet (self-closing), the saving of water in one building in this city being over 200,000 gallons in three months. For sale by Joseph Zane & Co., 81 Sudbury st., Boston, Mass.

A Rare Chance. Terms Reasonable.—Foundery and Machine Shop to Lease, for a term of years, in Galveston, Texas, the best location in the South. Address M. L. Parry, Galveston, Texas.

Union Arm Chairs, for hotels, offices, piazzas, and all places. Best in market. Made upon honor. Send for circular. F. A. Sinclair, Mottville, NY.

Manufacturers of Power Hoisting Machines send price list and circular to Cooper, Jones & Cadbury, Philadelphia.

Business Opening. For Sale—Lease, machinery, etc., of a metal-perforating and gas-burner business, long established, in this city. Several valuable patents go with the business. Apply to C. Sullivan, administrator, 119 Broadway, New York, Room 19.

Wanted—Partner with capital to help patent and bring out two inventions:—Heater for Feed-water to Boilers, and improvement in Driving Pulleys. Address Box 238, Tidioute, Pa.

Koch's Patent on shelving for stores is offered for sale—entire or State Rights. See illustrated description, Vol. XXI, No. 14, Scientific American, for particulars. Address Wm. & Geo. Koch, Cass Postoffice, Pa.

Wanted—A set of the best new machinery for converting standing trees into short, split firewood. W. H. H. Green, Jackson, Miss

For Machine for cutting green corn for canning or drying, address F. Lewis or Isaac McLellan, Gorham, Me.

To Manufacturers—For sale, a new 3-story stone building 60-ft. by 30-ft., with never-failing water-power. Facilities for shipping unsurpassed. Inquire of F. A. Sinclair, Mottville, Onondaga Co., N. Y.

Clothes Wringers of all kinds repaired or taken in part pay for the "Universal," which is warranted durable. R. C. Browning, Agent, 32 Courtlandt st., New York.

Wanted—Manager.—Wanted immediately, a manager for a Tube Works. Must understand the business thoroughly, and be capable of managing a large number of employees. References will be required. Address, stating where last employed. Lock Box 142, Pittsburgh, Pa.

Hot Pressed Wrought Iron Nuts, of all sizes, manufactured and for sale at moderate prices by J. H. Sternbergh, Reading, Pa.

For Sale—Cotton Planter.—The entire right of the King Cotton Planter—the only successful in use. Have been worked since the war, and given universal satisfaction. The machine is simple, strong, and can be built cheaply. Will sell at a low figure. Reason for disposing of it is want of time to give it proper attention. Address S. N. Brown & Co., Dayton, O.

Vols., Nos., and Sets of Scientific American for sale. Address Theo. Tusch, No. 37 Park Row, New York city.

Cold Rolled—Shafting, piston rods, pump rods, Collins pat. double compression couplings, manufactured by Jones & Laughlins, Pittsburgh, Pa.

Automatic Lathes, for spools and tassel molds, made by H. H. Frary, Jonesville, Vt.

If you want the real oak-tanned leather-belting, C. W. Arny manufactures it. See advertisement.

Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Ct.

Wanted—A contract for the manufacture of specialties, either hardware or tools. C. N. Trump, Machinist, Portchester, N. Y.

Man'f'rs of grain-cleaning machinery and others can have sheet zinc perforated at 2c. per sq. ft. R. Aitchison & Co., 845 State st., Chicago.

Wanted—To communicate with any party who has a practical knowledge of building and running a powder mill. Address "W," P. O. Box 5,692, New York city.

Send for a circular on the uses of Soluble Glass, or Silicates of Soda and Potash, fire and water-proof. Manufactured by L. & J. W. Feuchtwanger, Chemists and Drug Importers, 55 Cedar st., New York.

S. S. Pollard's celebrated Mill Picks, 137 Raymond st., Brooklyn.

Mill-stone dressing diamond machine, simple, effective, durable. Also, Glazier's diamonds. John Dickinson, 64 Nassau st., New York.

Leschot's Patent Diamond-pointed Steam Drills save, on the average, fifty per cent of the cost of rock drilling. Manufactured only by Severance & Holt, 16 Wall st., New York.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Machinists, boiler makers, tinners, and workers of sheet metals read advertisement of the Parker Power Presses.

Diamond carbon, formed into wedge or other shapes for pointing and edging tools or cutters for drilling and working stone, etc. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

For sale by State or County the Patent Right for the best Cultivator in use. For terms address Isaiah Henton, Shelbyville, Ill.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,423.—Furniture Caster.—J. L. Woolf, St. Louis, Mo. August 13, 1869.
2,529.—Motive Power.—H. Call, Concord, N. H. August 25, 1869.
2,544.—Hulling Apparatus.—J. F. B. Marshall and A. Jones, Boston, Mass. August 27, 1869.
2,547.—Apparatus for Refining Lard, etc.—C. J. Everett, Highwood Park, N. J. August 27, 1869.
2,553.—Treating Conglomerates of Cast Iron, etc.—T. S. Blair, Pittsburgh, Pa., and F. Ellerhausen, Ellerhouse, Nova Scotia. August 28, 1869.
2,569.—Machinery for Manufacturing Nails, Brads, etc.—E. L. Brundage, Middletown, N. Y. August 30, 1869.
2,570.—Furnace.—G. G. Clarkson and J. L. Paige, Rochester, N. Y. August 30, 1869.
2,577.—Washing Machine.—J. J. Grant, Philadelphia, Pa. August 30, 1869.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

J. R. M., of Kansas.—To find the flow of water through a 2-inch orifice under a head of twenty-five feet, you must first determine the velocity of the flow per second, and multiply this by the area of the aperture. You will then have the theoretical flow per second, although this is subject to some variations consequent upon the shape of the aperture, and other considerations which must be taken into account. Assuming that the aperture is round and the diameter two inches, the velocity would be forty feet per second. The area of the port is 3·14 square inches, which, multiplied into the velocity per second in inches, will give the amount theoretically discharged in cubic inches, or 1507·20 cubic inches per second. Two thirds this will be the *actual flow*, or 1004·8 cubic inches per second, equal to 1·66 horse-power. To utilize this power economically we advise the employment of a small turbine. A good work for you to get on such subjects is "Silliman's Physics."

G. B. A., of Ohio.—Cotton cloth may be rendered nearly fireproof by steeping it in a solution of alum and letting it dry. A better process is to starch it with starch mixed with phosphate of ammonia, a little more by weight of the salt than of the starch. Grind the dry starch and the salt together in a mortar, and then prepare the starch with the mixture in the usual way. After starching the cloth with this preparation, it should be rolled up in a dry cloth, and allowed to remain till nearly dry, and then ironed, using a little white wax to prevent the sticking of the iron.

H. B., of Tenn.—It takes just as much weight to pull down a balloon as it will carry up, and it is one of the most uneconomical of machines. It can only be advantageously employed where no other means of transportation are practicable. A balloon might be made to work in the manner you specify, and from the novelty of the thing passengers might be attracted. You are under a mistake as to the use of chairs on railroads. A rail placed on a tie without a chair, would soon be jammed down into the wood under heavy work. You should see and talk with some experienced railroad engineer.

J. F. J., of N. Y.—There is no doubt that the diving dress used by divers in submarine work, would have enabled people to have descended into the Avondale coal mine without danger of suffocation; but the dress is too weighty to be used in work unless partly sustained by the buoyant power of water. Besides the walls of a coal mine are very different things from water walls, and flexible pipes would stand a poor chance of maintaining their integrity in being sawed across their sharp angles.

G. L. B., of Mass.—The products of the combustion of all hydrocarbon oils are carbonic acid and water. The carbonic acid is formed by the chemical union of the carbon in the oil with the oxygen of the air, and the water is formed by the union of the hydrogen in the oil with the oxygen of the air. Ordinarily, the water, being converted by the heat into steam, escapes notice; but when a cold body, as a piece of iron, is held for a moment in the flame it condenses this steam and the water becomes visible. The theory of your friend is all wrong.

C. P. S. W., of N. C.—The white earth you send us is silicious lime, resulting from the remains of minute diatoms. Under the microscope the shells of the diatoms, covered with beautiful and delicate lines, are distinctly visible. We can have a sketch made of some of these shells, if you desire, at a charge of $5. The earth will probably be useful as a polishing powder.

G., of Tenn.—The recipe for the hair composed of oxide of bismuth, spermaceti, and lard, recommended to you, will be as harmless as any other grease plaster provided the oxide of bismuth does not contain arsenic, with which it often is found mixed. As a hair renewer it is no better than barn-yard manure or roadside mud.

J. S. C., of Me.—The sectional area of the horizontal flue leading from your boiler to the chimney, ought to be twenty-two inches in diameter instead of sixteen. No advantage would result from making the flues of chimneys taper towards the top. Horizontal flues ought to have from one fifth to one sixth more capacity than upright flues.

A. W., of N. Y.—We believe a fan to be a very uneconomical method of conveying the sawdust shavings, etc., from a mill to a fire room and cannot therefore advise it. We infer this from general principles, as we have not seen a fan used for that purpose. We are confident, however, that you will do better with the drag hitherto employed.

J. R. R., of Md.—We think salt as good as anything to pack eggs in for winter use. They should be kept in a dry cool room but not where they will freeze, and the package should be turned once a week to prevent the eggs from settling to one side of the shell.

J. L. R.—Nothing yet discovered is more effectual in retaining heat in vessels than thick coatings of loose felt. You can take a useful lesson from the Norwegian cooking apparatus, illustrated and described on page 161, current volume, of this paper.

S. S., of Conn.—You can use screws in making the model. The mineral you send appears to be mica schist, containing minute garnet specimens.

J. H. Keine.—We advise the use of plumbago (black lead) mixed with tallow for wooden cogs.

W. E. E., of R. I.—Etherial phosphorus, so-called, is a simple solution of phosphorus in ether.

G. G. W., of Pa.—The information you seek will shortly appear in our columns.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

Combined Cotton and Corn Planter.—A. H. Wootton, Bartow, Ga.—This invention has for its object to furnish a simple, convenient, and effective machine, which shall be so constructed and arranged that it may be easily adjusted for use, for planting cotton seed or corn, as may be desired.

Fruit Jar.—J. M. W. Kitchen, Brooklyn, N. Y.—This invention has for its object to improve the construction of fruit or preserve jars, so as to make them simpler in construction, and more convenient, reliable, and effective in use.

Curry Comb.—John M. Baker, Marshfield, Ohio.—This invention has for its object to improve the construction of curry combs, so that when the front teeth have become worn, the comb-plate may be reversed or turned half way around, causing the rear teeth to become the front ones, enabling the curry comb to be used much longer than it otherwise could be.

Corn Harvester.—John McLeish, Chicago, Ill.—This invention has for its object to furnish a simple, convenient, and effective machine, by means of which the corn stalks may be cut, the ears separated from the stalks and deposited in a suitable receptacle, and the stalks deposited in bundles or bunches upon the ground.

Revolving Plow.—Wm. J. Dawson, Brookfield, Mo.—This invention has for its object to furnish a simple, convenient, and effective machine, by means of which cultivated land may be prepared for the reception of the seed thoroughly and well, and which may be operated with a comparatively light draft.

Fireplace Heater.—R. D. McDonald, Jersey City, N. J.—This invention has for its object to furnish an improved open grate fireplace heater, which shall be so constructed and arranged as to utilize the heat that usually escapes into the chimney, economizing fuel and obtaining the advantages of a stove and open fire.

Churning Machine.—Samuel D. Lucas, Winterpock, Va.—This invention has for its object to furnish a simple and convenient churning apparatus, by means of which one or more churns may be operated at the same time, bringing the butter in a very short time and with a comparatively small amount of labor.

Sickle Grinder.—Henry Millard, York, N. Y.—This invention has for its object to furnish an improved machine for grinding, mowing, and reaping machine cutters, which shall be simple in construction, easily operated, and so arranged that the cutters may be ground all the way from point to heel.

Revolving Dough Mixer.—Thomas Holmes, Williamsburgh, N. Y.—This invention has for its object to improve the construction of the improved dough mixer, patented by the same inventor, June 15, 1869, and numbered 91,335, so as to make it simpler and less expensive in construction while doing its work equally well.

Cultivator.—Isaac J. Morrow, Everton, Ind.—This invention has for its object to furnish an improved cultivator, which shall be so constructed and arranged that the amount of dirt allowed to pass to the plants may be conveniently controlled and regulated.

Hay and Grain Elevator.—John Dennis, Oswego, N. Y.—This invention has for its object to furnish an improved apparatus, by means of which an entire load of hay or grain may be raised to the upper part of a barn at one operation, thereby saving the labor and time required when it is pitched up or raised by the forkfull.

Combined Sofa and Bed.—Wm. H. Schwalbe, New York city.—This invention has for its object to improve the construction of combined sofas and beds, so as to make them more convenient in use, and so as to better adapt them for use in the various places in which they may be required.

Spring for Wagon Tongues.—George Alexander, Romney, Ind.—This invention has for its object to furnish an improved attachment for the forepart of a wagon gearing, by means of which the tongue may be supported at a greater or less elevation, as desired, so as to relieve the horses' necks from the weight of the tongue, and in a great measure protect them from the thrashing of the tongue when the wheels strike an obstruction.

Coffeepot.—Hermann von Holten, Hoboken, N. J.—This invention has for its object to furnish an improved coffeepot, which shall be so constructed and arranged as to force the boiling water through the compartment containing the ground coffee, which water extracts the strength from the coffee and flows thence into another compartment whence it is poured out for use.

Process for Preserving Eggs.—John Longmaid, New York city.—This invention relates to a new and useful improvement in preserving eggs for market and use.

Sewing Machine.—M. C. Hawkins, Edinboro', Pa.—This invention consists in a novel manner of connecting the upper, or needle, with the lower, or shuttle shaft, by means of a pitman and loose crank, and in a novel manner of arranging and operating the take-up bar, and of combining it with the needle bar, so that it will operate in conjunction with the same.

Rocking Carriage.—A. Armando, New York city.—This invention relates to a new carriage, more particularly intended for children, and so constructed that it may be propelled by rocking motion, and that it will be rocked when propelled by other means.

Railroad Station Indicator.—A. C. Rodgers, Fort Washington, Pa.—This invention relates to a new apparatus for displaying, within railroad cars, the name of the station which the car is approaching, or at which it has arrived. The invention consists of a system of levers and toothed wheels, by which intermittent rotary motion, in either direction, can be imparted to a drum, around which a belt or chain containing the names of the stations is placed. The apparatus is set in motion by a stop arranged on the track striking a lever suspended from the car.

Safe.—Joseph P. White, Savannah, Ga.—This invention consists in constructing the safe of an inner thick and strong shell of metal, and an exterior thin shell made of chilled iron, and having on its interior surface flint, emery, or any other substance which in drilling will generate sparks of fire to explode powder, with which a space between the two shells is to be filled so as to blow off the outer shell, to create alarm and to disable the burglars.

Water Wheel.—W. E. Hill, Renovo, Pa.—This invention consists in an improved arrangement of buckets, designed to cause both a direct and reacting application of the water; that portion of the buckets designed for the reacting application of the water being made adjustable by the action of springs to vary the discharge orifices, as the volume of water or the resistance of the wheel changes. It also consists in an improved arrangement of the gates, and also in an arrangement for packing the joints between the wheel and the scroll.

Cotton Press.—C. J. Beasely, Petersburg, Va.—This invention relates to improvements in cotton presses, having for its object an improved arrangement of means whereby the follower may be worked, both up and down, by the same operating lever, working in the same way; also a simple arrangement for varying the leverage, as the force required is greater or less; also an improved arrangement of the follower to facilitate filling the case.

Railroad Car.—Perry Prettyman, Paradise Spring Farm, Oregon.—This invention relates to improvements in railroad cars, the object of which is to prevent them from running or being thrown off the track from any cause. It consists in the application to the car trucks of auxiliary axles and wheels so arranged that the said wheels will be suspended between an inward projecting portion or flange of the top of the rail, and a corresponding widened portion of the bottom of the rail, the upper flange of the said rail serving by its action on the auxiliary wheels to hold the cars from running off, and the lower flange serving for the track of the said auxiliary wheels, which receive and support the cars of the main axle brake.

Operating Churn Dasher.—William Kegg, Lassellsville, N. Y.—This invention relates to an improvement in the method of operating the dashers of butter churns of the old style, or where the dasher is attached to a rod or staff, and given a vertical reciprocating motion by hand, or by means of any other suitable power.

Self-Winding Clothes-line Machine.—W. A. Coventry, Paterson, N. J.—This invention relates to a new and useful improvement in an apparatus for automatically winding up a cord, or clothes-line.

Self-Closing Faucet.—A. Brinckmann, New York city.—This invention relates to a new faucet for water pipes and other purposes, which is to be self closing, so that no liquid can be lost by accidentally leaving the faucet open. The invention consists in attaching a weighted lever to the spigot of the faucet which lever will always automatically draw the faucet closed, and which will also serve as a handle for operating the faucet.

Horse Power.—C. L. Drury, Rockingham, Vt.—This invention relates to a new horse power of that class in which the animal moves on an inclined plane or disk, and the invention consists in the arrangement of devices for adjusting the position of said wheel and in the application of adjustable

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anti-friction bearings for the transmitting axle, as well as in the general arrangement and combination of parts.

TELEGRAPH APPARATUS.—David Flanery, New Orleans, La.—The object of this invention is to provide a portable telegraph apparatus comprising a "relay magnet," "key," "sounder," "local galvanic battery," and writing desk, all contained in a portable box such as may be slung upon the shoulder by a strap, to be carried from place to place by the operator. Also, to provide an improved local battery specially adapted for a portable apparatus.

GALVANIZED IRON.—J. D. Grey, Pittsburgh, Pa.—This invention consists in preparing the iron, previous to galvanizing it, in a way calculated to provide a better article in point of toughness and appearance when finished, the zinc covering being disposed much more evenly and in large spangles over the entire surface of the sheet.

SIDE-SADDLE TREES.—Louis Triplett, Columbia, Ky.—This invention relates to improvements in the construction of side-saddle trees, and consists in forming the cantel belly, right horn, and spring, of one piece of sheet metal, and the "straining" and foundation of the seat of another piece in a way to produce an improved form and more economical construction.

BIT HOLDER.—Jacob Winkelhouse, New York city.—The present invention relates to a new and useful device for securing bits in their places by means of a slotted bolt and spring.

BROWNING AND MAKING COFFEE.—James Galloway, Chetopah, Kansas.—This invention relates to a new and useful improvement in the method of preparing coffee, whereby much time is saved, and the entire aroma is preserved.

TRACTION ENGINES.—C. C. Merriman, Brighton, N. Y.—This invention relates to an improvement in traction engines, and it consists in producing the traction by feet secured to revolving wheels.

THRASHING MACHINE.—Joshua Siep and Henry J. Schmeyer, Macungie, Pa.—This invention relates to new and useful improvements in machines for thrashing and cleaning grain, whereby many of the objections to the old style of thrashing machine are obviated.

RAILROAD.—George V. Sheffield, and Jas. F. Coburn, Hopkinton, Mass.—This invention relates to new and useful improvements in railroads, having reference both to the rail and track, and the flange and tread of the wheel to run thereon.

WATER-CLOSET VALVE.—W. Smith, San Francisco, Cal.—This invention relates to new and useful improvements in valves for water closets, whereby they are rendered more useful and durable than they have hitherto been.

SELF-CLOSING TELEGRAPH KEY.—Joseph J. B. Frey, New York city.—This invention relates to a new and improved key for telegraphic instruments, whereby the circuit is always kept closed when the instrument is not at work, the key automatically closing when released from the pressure of the finger or hand.

MACHINE FOR PICKING WOOL.—James Cate, Rumsey, Ky.—This invention relates to a new and useful improvement in machines for picking and cleaning wool.

HAME-BENDING MACHINE.—J. H. Preston, Jefferson City, Mo.—This invention relates to a new and improved machine for bending wooden hames whereby that operation is greatly facilitated.

EXTENSION TABLE.—Joseph P. Curry, Vincennes, Ind.—This invention relates to a new and useful improvement in extension tables, whereby they are made more convenient and useful than they have heretofore been, and consists in extending and contracting the table by means of a shaft, crank, and cords.

VAPORIZING FURNACE AND PANS.—L. Scott, Sinking Spring, Ohio.—This invention relates to a furnace and an arrangement of pans for boiling and vaporizing juice or sirup, in the process of working sorghum sugar or molasses, and for other purposes of a similar nature.

THRASHING MACHINE.—F. A. Geisler, Bristol, R. I.—This invention relates to new and useful improvements in machines for thrashing grain, and winnowing or cleaning it at the same time.

HAY FORK.—E. J. Fenn, Medina, Ohio.—This invention relates to new and useful improvements in forks for handling hay, and consists in operating two tines by means of a bar and lever.

COMPOUND FOR RESTORING DAMAGED TOBACCO.—Wesley A. Wright, Liberty, Va.—The object of this invention is to produce a substance for restoring the good qualities of moldy or decaying tobacco so that it will again receive as nearly as possible the qualities and appearance of fresh and good tobacco, for the purpose of preventing its loss.

STUMP EXTRACTOR.—T. W. Fay, Camden, N. J.—This invention relates to a new stump extractor, or stone and log lifter of that class in which the power is applied to a screw shaft by means of a nut. The invention consists in a new manner of supporting the nut to avoid friction, and in a novel manner of fastening the supports to the main plate and the shoes to the supports.

RAILROAD CAR HEATER.—Josiah E. Kline, Wheeling, West Va.—This invention relates to a new apparatus for heating railroad cars and for properly ventilating the same, and consists in the general construction and arrangement of parts for producing a fireproof and convenient heating attachment.

UNIVERSAL GUIDE FOR STAMP MILLS.—C. A. H. Rice and A. J. Van Deren, Central City, Colorado.—This invention relates to a new device for guiding the shafts of stamp mills, and consists in the general construction of parts, whereby the guide pieces are securely held and readily adjusted.

WIND WHEEL.—Charles C. Harris, Lafayette, Ill.—The object of this invention is to provide a simple and cheap wind wheel with self-adjusting wings, or brackets, capable of opening to the wind on one side and closing on the other. The invention also comprises an improved arrangement for transmitting motion from the said wheel, especially adapted for operating pumps.

LAMP.—H. Long, Kittanning, Pa.—This invention consists in an improved arrangement of means for conducting the wick through a reservoir of water after having taken up the oil, the said water reservoir being interposed between the oil and the flame so as to prevent generation of gas; also to prevent the contact of the flame with the oil in the reservoir.

CULTIVATING HOE.—John J. Ray and James R. Young, New Orleans, La.—This invention consists in the arrangement of a pair of scraping blades, of wood or metal, to work on the ground in an edgewise position in the form of two sides of a triangle, cut off at some distance from the apex, and connected by framing so that it will allow the said blades to work on each side of the row without disturbing the standing plants, the ends most widely separated being drawn foremost, to gather the earth and turn it up in a double ridge against the rows of plants. Near the bottom inside, the blades are provided with laterally projecting cutters to sever the weeds, and wheels are placed at the front end on which the frame may be tilted to be moved from one row to the other.

FLY BRUSHES.—Henry R. Robbins, Baltimore, Md.—This invention relates to a portable apparatus in which a brush or fan is made to oscillate by means of machinery for the purpose of driving flies from a table or bed, and creating, at the same time, a breeze.

HORSESHOE.—Capt. Charles Peillard, of the Empire of France.—This invention consists in dividing a horseshoe in two parts, of equal length, the division taking place at the middle, and the line of section being partly straight and partly circular, so as to form, at the extremity of one branch, a curved projection, and, at the adjacent extremity of the other branch, a depression of corresponding shape, by which the two branches are connected when nailed upon the hoof, without a hinge.

RESERVOIR BACK FOR COOKING STOVES.—Henry R. Robbins, Baltimore Md.—The object of this invention is to provide an attachment for cooking stoves, which will enable the cook always to have a supply of hot water on hand, the quantity and boiling temperature of which can be seen at a glance, without removing the cover of the boiler. At the same time, the construction and arrangement of the apparatus are such as to protect the back of the fire-pot from burning away, thereby rendering the stove more durable and less expensive, in the matter of repairs, than those heretofore introduced into general use.

LAMP SHADE.—R. W. Churchill, Bridgeport, Conn.—This invention relates to improvements in lamp shades for application to the chimneys of kerosene and other similar lamps, having for its object to provide an improved construction and arrangement for shades made in sections for expanding and contracting, to vary the size of the shade.

HORSE HAY RAKE.—W. P. Ewing, Fancy Hill, Va.—This improvement in horse hay rakes is designed to provide a simple and efficient machine for attachment to a sulky, whereon the operator may ride while driving and attending to the rake, and it consists in a rake having one set of teeth, detachably connected to the sulky, and provided with suitable operating and governing apparatus.

HOISTING APPARATUS.—G. H. Kamnacher, Columbus, Ohio.—The object of this invention is to provide a cheap and simple portable hoisting apparatus for bricklayers and builders, for hoisting the building material, and it consists of a peculiar arrangement, on a bench or "horse," of a large grooved hoisting wheel, a pair of balancing platforms, vertical guides for the same, and hoisting ropes.

COMBINATION LOCK.—J. P. White, Savannah, Ga.—This invention relates to improvements in combination locks, consisting of a series of vibrating tumblers, notched at the ends for the reception of a lug on the bolt, when sliding back for unlocking, which are provided with auxiliary tumblers, to be acted on by a series of rotating cam disks worked by the key, to move the said tumblers for bringing the notches therein to the position coinciding with the lug on the bolt, to allow it to be retracted. These auxiliary tumblers are engaged with the others by spring dogs, when the bolt is at the locked condition, and the whole are suspended on the cam wheels, so that the notches do not coincide with the lug on the bolt, thereby preventing its withdrawal.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING SEPT. 21, 1869.

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Patent Solicitors, No. 37 *Park Row, New York.*

94,934.—REVENUE STAMPS FOR CIGARS.—Anson Atwood, New York city. Antedated September 13, 1869.
94,935.—ALLOY FOR TUBING.—John S. Barden, Providence, R. I.
94,936.—ALLOY FOR MAKING WATER METERS.—John S. Barden, Providence, R. I.
94,937.—BOILER FEED WATER REGULATOR.—John S. Barden, Providence, R. I.
94,938.—WASHING MACHINE.—George W. Benton, East Pike, N. Y.
94,939.—FELTING MACHINE.—Job W. Blackham (assignor to himself and James H. Prentice), Brooklyn, N. Y.
94,940.—BRUSH.—Charles Boeckh, Buffalo, N. Y.
94,941.—BRUSH.—Samuel Brillinger, Clarence Center, N. Y.
94,942.—APPARATUS FOR EVAPORATING CANE JUICE.—M. S. Bringier, Ascension Parish, La.
94,943.—AXLE BOX LID.—John Bristow, Detroit, Mich. Antedated September 6, 1869.
94,944.—SIGNS FOR STREET LAMPS.—Erastus Caswell and Herman Lachmann, Chicago, Ill.
94,945.—SASH PULLEY.—Charles B. Clark, Buffalo, N. Y.
94,946.—SCRUBBER.—Charles E. Clum (assignor to himself and Moses C. Haskell), Troy, N. Y.
94,947.—MACHINE FOR CLOSING THE SEAMS OF METALLIC VESSELS.—E. T. Covell, Brooklyn, N. Y. Antedated September 10, 1869.
94,948.—PROTECTOR FOR STEMS OF BOATS.—Wm. P. Davis and Samuel Elwell, Jr., Gloucester, Mass.
94,949.—DOOR SPRING.—Frederick Dodge, Syracuse, N. Y.
94,950.—SURGE RELIEVER FOR CABLES.—John J. Emery, Owl's Head, Me.
94,951.—NECKTIE.—Franklin Field, Troy, N. Y.
94,952.—GRINDING MILL.—Morrison Foster, Cleveland, Ohio.
94,953.—PORTABLE FENCE.—Newton J. Glover, Waveland, Ind. Antedated August 31, 1869.
94,954.—WASHING MACHINE.—J. T. Greenwood, Beloit, Wis.
94,955.—COMPOUND FOR EMERY WHEELS AND OIL STONES.—N. B. Hadley and R. J. Costain, Northampton, Mass.
94,956.—MACHINE FOR DRESSING MILLSTONES.—J. B. Harris, Ottawa, Ill.
94,957.—MOUNTING LEASE RODS FOR LOOMS, ETC.—Wm. A. Hastings, Thorndyke, Mass.
94,958.—TILE MACHINE.—Simeon Hawkins, Carmel, Ind.
94,959.—APPARATUS FOR EVAPORATING CANE JUICE.—L. S. Hereford, West Baton Rouge parish, La.
94,960.—BRAKE SHOE.—Amos A. Hotchkiss (assignor to himself and Wm. J. Qualey), Hannibal, Mo.
94,961.—ARGAND LAMP.—Andrew B. Howland, Titusville, Pa.
94,962.—HOLDBACK FOR CARRIAGES.—Thomas F. Kiff, Havana, N. Y., assignor to Elijah A. Simmons, Chatsworth, Ill.
94,963.—FIELD FENCE.—Edwin King, Dunkirk, N. Y.
96,964.—ADJUSTABLE HARROW.—John Kinhart, Athens, Ill.
94,965.—METALLIC BUTTON-HOLE OR CLASP.—Jeremiah R. Little, Jamaica Plains, Mass.
94,966.—HARVESTER.—Charles E. Mason, Elgin, Ill.
94,967.—DRYER.—Oscar F. Mayhew, Indianapolis, Ind.
94,968.—GAGE FOR TURNING BEVELS.—George W. Moore, Worcester, Mass.
94,969.—METHOD OF PURIFYING NITRIC ACID.—George M. Mowbray, Titusville, Pa.
94,970.—RAILWAY FROG.—James Patterson, Hornellsville, N. Y.
94,971.—ARCHIMEDEAN SCREW WATER ELEVATOR.—Wm. H. Plumb, New York city. Antedated September 8, 1869.
94,972.—CHIMNEY.—Peter Portois, San Francisco, Cal.
94,973.—STEAM ENGINE VALVE.—Elting Post, Boston, Mass.
94,974.—WEIGHING SCOOP.—David H. Priest, Watertown, and John R. Howard, Charlestown, Mass.
94,975.—ANIMAL TRAP.—Wm. N. Reed, Washington, D. C.
94,976.—SEWING MACHINE.—T. S. Reeve, C. D. Smith and H. L. Swartwout, Chicago, Ill.; said Smith and Reeve assign their right to said Swartwout.
94,977.—BASKET FOR GRINDING TILE.—Peter C. Reniers, Pittsburgh, Pa.
94,978.—STEAM GENERATOR.—S. T. Russell, Springfield, Ohio.
94,979.—SPRING SEAT FOR VEHICLES.—Samuel S. Simmons, Watsonville, Cal.
94,980.—NEEDLE THREADER.—Corelli W. Simpson, Bangor, Me.
94,981.—CARRIAGE SPRING.—Alfred E. Smith, Bronxville, N. Y. Antedated September 15, 1869.
94,982.—GAS MACHINE.—Andrew R. Spang and Daniel F Sheaf, Dayton, Ohio.
94,983.—CLOTHES POUNDER.—Orrin J. Stickles, Canton, N. Y
94,984.—FIREPLACE.—James C. Strong and Luther C. McNeal, Buffalo, N. Y.; said Luther C. McNeal assigns his right to said James C Strong.
94,985.—MACHINE FOR PAINTING FLOOR OILCLOTHS.—C. W. Strout and Amos Wilder, Hallowell, Me,
94,986.—STOVEPIPE DAMPER.—Isaac Van Hagen, Chicago, Ill.
94,987.—BAG AND SHOE-STRING FASTENER.—John H. Weeden (assignor for one half to George C. Thomas), Waterbury, Conn.
94,988.—DUMPING CART.—F. Hancock Williams, Washington, D. C.
94,989.—WAGON-TONGUE SUPPORT.—George Alexander, Romney, Ind.
94,990.—ROCKING CARRIAGE.—A. Armando, New York city.
94,991.—CURRY COMB.—J. M. Baker, Marshfield, Ohio.
94,992.—VELOCIPEDE.—Robert J. Barr, Philadelphia, Pa.
94,993.—COTTON PRESS.—Charles J. Beasley (assignor to himself and Tappey, Lumsden & Co.), Petersburg, Va.
94,994.—MANUFACTURE OF IRON AND STEEL.—Henry Bessemer, London, England. Patented in England, December 31, 1867.
94,995.—MANUFACTURE OF IRON AND STEEL.—Henry Bessemer, London, England. Patented in England, March 21, 1868.
94,996.—MANUFACTURE OF IRON AND STEEL.—Henry Bessemer, London, England. Patented in England, March 21, 1868.
94,997.—MANUFACTURE OF IRON AND STEEL.—Henry Bessemer, London, England. Patented in England March 31, 1868.
94,998.—SELF-CLOSING FAUCET.—A. Brinckmann, New York city.
94,999.—WOOL-PICKING MACHINE.—James Cate, Rumsey, Ky.
95,000.—LAMP SHADE.—R. W. Churchill, Bridgeport, Conn.
95,001.—WATER CLOSET.—Geo. Conrou, New York city. Antedated Sept. 8, 1869.
95,002.—SELF-WINDING LINE MACHINE.—Wm. A. Coventry, Paterson, N. J.
95,003.—EXTENSION TABLE.—J. P. Curry (assignor to S. S. Burnet), Vincennes, Ind.
95,004.—BOX LOOP FOR CARRIAGE TOPS.—C. H. Davis, Syracuse, N. Y.
95,005.—REVOLVING PLOW.—William J. Dawson, Brookfield, Mo.
95,006.—HAY AND GRAIN ELEVATOR.—John Dennis, Oswego, N. Y.
95,007.—HAMES FASTENER.—M. L. Drake, Rockford, Ill.
95,008.—HORSE-POWER.—C. L. Drury, Rockingham, Vt.
95,009.—METHOD OF HEATING TAN-BARK LEACHES BY STEAM.—L. C. England, Philadelphia, Pa.
95,010.—HORSE HAY RAKE.—Wm. P. Ewing, Fancy Hill, Va.
95,011.—STUMP EXTRACTOR.—T. W. Fay, Camden, N. J.
95,012.—HORSE HAY FORK.—E. J. Fenn, Medina, Ohio.
95,013.—TELEGRAPH APPARATUS.—David Flanery, New Orleans, La.
95,014.—SELF-CLOSING TELEGRAPH KEY.—J. J. B. Frey, New York city.
95,015.—COFFEE ROASTER.—James Galloway, Chetopah, Kansas.
95,016.—THRASHING MACHINE.—F. A. Geisler, Bristol, R. I.
95,017.—MANUFACTURE OF GALVANIZED IRON.—J. D. Grey (assignor to himself and John Lippincott), Pittsburgh, Pa.
95,018.—WIND MILL.—C. C. Harris, LaFayette, Ill.
95,019.—SEWING MACHINE.—M. C. Hawkins, Edinborough, Pa.
95,020.—WATER WHEEL.—Wm. E. Hill, Renovo, Pa.
95,021.—REVOLVING DOUGH MIXER.—Thomas Holmes, Williamsburgh, N. Y.
95,022.—HOISTING APPARATUS.—G. H. Kamnacher, Columbus, Ohio.
95,023.—OPERATING CHURN DASHER.—William Kegg, Lassellsville, N. Y.
95,024.—DOOR KNOB.—J. J. King, New York city.
95,025.—FRUIT JAR.—J. M. W. Kitchen, Brooklyn, N. Y.
95,026.—RAILROAD CAR HEATER.—J. E. Kline, Wheeling, West Va.
95,027.—LAMP.—Henry Long, Kittanning, Pa.
95,028.—PROCESS FOR PRESERVING EGGS.—John Longmaid, New York city.
95,029.—CHURN.—S. D. Lucas, Winterpock, Va.
95,030.—FIREPLACE.—R. D. McDonald, Jersey City, N. J.
95,031.—CORN HARVESTER.—John McLeish, Chicago, Ill.
95,032.—TRACTION ENGINE.—C. C. Merriman, Brighton, N. Y.
95,033.—MACHINE FOR GRINDING MOWER & REAPER KNIVES.—Henry Millard, New York city.
95,034.—MACHINE FOR WINDING BOBBINS.—F. H. Morrill, Philadelphia, Pa.
95,035.—CULTIVATOR.—Isaac J. Morrow, Everton, Ind.
95,036.—COMPOSITION FOR USE IN FIRE EXTINGUISHERS.—J. M. Muterse and H. G. De Valory, Guerande, France.
95,037.—MACHINE FOR BENDING WOOD.—H. H. Nichols (assignor to P. S. Whitcomb), Keeseville, N. Y.
95,038.—MEAT-CUTTING MACHINE.—August Nittinger, Jr., Philadelphia, Pa.
95,039.—EXTRACT OF MADDER FOR DYEING AND PRINTING.—Alfred Paraf, New York city, assignor to Edward Sabine Renwick, trustee.
95,040.—PROCESS FOR PRINTING COLORS ON TEXTILE MATERIALS.—Alfred Paraf, New York city, assignor to Edward Sabine Renwick, trustee.
95,041.—RAILWAY RAIL CHAIR.—D. C. Pierce, Washington, D. C. Antedated Sept. 8, 1869.
95,042.—MACHINE FOR BENDING WOOD.—J. H. Preston, Jefferson City, Mo.
95,043.—RAILWAY CAR TRUCK.—Perry Prettyman, Paradise Spring Farm, Oregon.
95,044.—CULTIVATING HOE.—J. J. Ray and J. R. Young, New Orleans, La.
95,045.—GUIDE FOR STAMP MILLS.—C. A. H. Rice and A. J Van Deren, Central City, Colorado Territory.
95,046.—RAILROAD STATION INDICATOR.—A. C. Rodgers (assignor to himself and Lewis Shaffer), Fort Washington, Pa.
95,047.—STRAW CUTTER.—J. H. Ryland, Baltimore, Md.
95,048.—SOFA AND BEDSTEAD.—William H. Schwalbe, New York city.
95,049.—PAN AND FURNACE FOR EVAPORATING.—Lewis Scott, Sinking Spring, Ohio. Antedated Sept. 10, 1869.
95,050.—COMBINED THRASHING MACHINE AND SEPARATOR.—Joshua Seip and H. J. Schmeyer, Macungie, Pa.
95,051.—RAILWAY.—G. V. Sheffield and J. F. Coburn, Hopkinton, Mass.
95,052.—SAW.—Joseph H. Smith, and Elijah G. Peckham, Toledo, Ohio.
95,053.—NICKEL-FACED TYPE.—Luther L. Smith, Brooklyn, N. Y.
95,054.—SLOW-CLOSING VALVE FOR WATER CLOSETS.—W. Smith, San Francisco, Cal.
95,055.—SIDE-SADDLE TREE.—Louis Triplett, Columbia, Ky.
95,056.—COFFEEPOT.—H. Von Holten, Hoboken, N. J.
95,057.—ROTARY MECHANICAL POWER.—A. G. Waterhouse, San Francisco, Cal.
95,058.—COMBINATION LOCK.—J. P. White, Savannah, Ga.
95,059.—SAFE.—J. P. White, Savannah, Ga.
95,060.—BIT HOLDER.—Jacob Winkelhouse, New York city.
95,061.—MINING PUMP.—Hiram Wolf (assignor to himself and A. D. Wolf), St. Louis, Mo.
95,062.—COMBINED CORN AND COTTON PLANTER.—A. H. Wootton, Bartow, Ga.
95,063.—COMPOUND FOR RESTORING DAMAGED TOBACCO.—Wesley A. Wright (assignor to himself and William C. Trowbridge), Liberty, Va.
95,064.—COATING IRON FOR THE FRONTS OF BUILDINGS, AND FOR OTHER PURPOSES.—John Alexander, Greenpoint, N. Y.
95,065.—EXPANDING MANDREL.—D. L. Allen, Williamsport, Pa.
95,066.—HEARSE.—Edwin Allen, Norwich, Conn.
95,067.—MARKER FOR SEEDING MACHINES.—George Armstrong, Elmira, Ill.

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95,068.—Corn Planter.—James Armstrong, Jr., Elmira, Ill.
95,069.—Motive Power for Sewing and other Machines.—J. B. Ayer, Elizabeth, N. J. Antedated Sept. 10, 1869.
95,070.—Horse-Rake Teeth.—J. L. Bartlett and J. B. L. Bartlett, North Jay, Me.
95,071.—Composition for Roofing and Paving.—Giacinto Bartolomei, Chicago, Ill.
95,072.—Device for Preventing Cattle from Jumping.—Charles Bettinger, South Dansville, N. Y.
95,073.—Wheat Drill.—Hiram Blunt and R. C. Blunt, Bath, Ill., by Hiram Blunt for himself, and Hiram Blunt and Mary Jane Blunt, executors of R. C. Blunt, deceased.
95,074.—Hat Ventilator.—Thomas W. Bracher, New York city.
95,075.—Manufacture of White Lead.—S. R. Bradley, New York city.
95,076.—Table and Bedstead.—James L. Brander, Boston, Mass.
95,077.—Faucet.—John Broughton, New York city.
95,078.—Sausage Stuffer.—A. L. Brouse and Urias Weidman, Lake, Ohio.
95,079.—Shield for Corn Plows.—D. F. Brown, Champaign, Ill., and E. C. Brown, Crawfordsville, Ind.
95,080.—Folding Umbrella.—S. B. Bushfield, Jr., Parkersburg, West Va.
95,081.—Cane and Whip Combined.—C. L. Bushnell, Jefferson, Ohio.
95,082.—Gang Plow.—Robert Carson, Meredosia, Ill.
95,083.—Gate.—I. A. Clark, Marion, N. Y.
95,084.—Billiard and Bagatelle Table.—W. A. Clark, Boston, Mass.
95,085.—Corn Planter.—J. S. Coen, Attica, Ind.
94,086.—Signal Holder for Railway Cars.—W. W. Colley and W. H. Deitrick, Philadelphia, Pa.
95,087.—Heel for Boots and Shoes.—Henry Cordtz, Chicago, Ill.
95,088.—Pump.—C. A. Crowell, Newark, N. J. Antedated September 13, 1869.
95,089.—Device for Collecting Petroleum from the Surface of Water Courses.—L. H. Cowley, Silver Creek, N. Y.
95,090.—Levee.—W. P. Craig, Milton, Ky.
95,091.—Ticket Cutter.—L. O. Crocker, Braintree, Mass.
95,092.—Loom.—George Crompton, Worcester, Mass.
95,093.—Thill Coupling.—P. D. Crosby, Danbury, Conn. Antedated Sept. 11, 1869.
95,094.—Fulling Mill. — Ernest Dams, Newark, N. J. Antedated Sept. 17, 1869.
95,095.—Artificial Sliding Hill.—C. De Bodisco, St. Petersburgh, Russia, and P. D. De Rivera, Madrid, Spain.
95,096.—Apparatus for Making Butter.—Avery Denison (assignor to himself and Wm. Keil), Woodville, Ohio.
95,097.—Manufacture of White Lead.—C. W. Dwelle, St. Louis, Mo.
95,098.—Carriage Wheel.—W. P. Elam, Petersburgh, Ill.
95,099.—Pile for Railroad Chairs.—David Eynon, Richmond, Va.
95,100.—Beehive.—H. H. Flick, Lavansville, Pa. Antedated Sept. 8, 1869.
95,101.—Hinge for Blinds.—W. T. Freligh, Jersey City, N. J.
95,102.—Instrument for Tightening and Loosening Screw Caps of Fruit Jars.—Alonzo French, Philadelphia, Pa.
95,103.—Hinge for Boxes.—Russel Frisbie (assignor to J. and E. Stephens & Co.), Cromwell, Conn.
95,104.—Urn Stand.—C. E. Goodhue, Malden, Mass.
95,105.—Spring-Bed Bottom.—George C. Grut, Milwaukee, Wis.
95,106.—Bake Oven.—I. A. Hammer, Newton, Iowa.
95,107.—Elastic Cushion for Horses' Feet.—John Hazeltine, Melrose, and C. L. Wheeler, Cambridge, Mass.; said Hazeltine assigns his half to said Wheeler.
95,108.—Brick Machine.—C. V. Hemenway (assignor to himself and A. A. Powers), New London, Ohio.
95,109.—Coffin.—A. W. Hendrick, Batavia, Ill.
95,110.—Sash Holder.—Coleman Hicks, Lancaster, Ky.
95,111.—Trunk Hasp.—Louis Hillebrand, Philadelphia, Pa.
95,112.—Let-Off and Tension Device for Spools of Braiding Machines.—W. J. Horstmann, Philadelphia, Pa.
95,113.—Machine for Forming Screw Threads on Sheet Metal Caps.—Thomas Houghton, Philadelphia, Pa.
95,114.—Dredging Apparatus.—Bernard Hughes and Daniel Hughes, Rochester, N. Y.
95,115.—Attachment for Lamp Burners.—Robert Hutton (assignor to himself and J. T. G. Middleton), Williamsburgh, N. Y.
95,116.—Bird Cage.—J. C. Jewett and John Vogt, Buffalo, N. Y.; said Vogt assigns his right to said Jewett.
95,117.—Machine for Turning Tapers.—Clark Jillson, Worcester, Mass.
95,118.—Twine Holder.—E. M. Judd, Wolcottville, Conn.
95,119.—Washing Machine.—Henry Lighty, Attica, Ind.
95,120.—Clothes-Line Fastener.—M. H. Lineback, Greenfield, Ind.
95,121.—Seed Planter.—H. C. Locke, Somerville, Tenn.
95,122.—Railway Car and Driving Wheel.—N. C. Lombard, Cambridge, assignor to J. A. Woodbury, Winchester, Mass.
95,123.—Fence Post.—Clark Losee, Perrysburgh, N. Y.
95,124.—Churn.—P. J. Manning, Troy, Ill.
95,125.—Sled.—James Martin, Chesterfield, Ohio.
95,126.—Dentist's Impression Cup.—G. McDonald, Athens, Ga.
95,127.—Shingle Binder.—G. E. More, Royalton, Wis.
95,128.—Watch.—C. S. Moseley, Elgin, Ill.
95,129.—Mortising Machine.—Arthur O. Neal, Hyde Park, Mass.
95,130.—Childs' Round Comb.—C. H. Noyes, Brooklyn, N. Y.
95,131.—Cracker and Grinding Mill.—Charles Parker, Meriden, Conn.
95,132.—Corn Drill.—R. F. Patton, Quincy, Ohio.
95,133.—Horseshoe.—Charles Peillard, France.
95,134.—Car Window.—G. W. Perry, Wilmington, Del.
95,135.—Coffee and Spice Mill.—Henry Petrie, Chicago, Ill.
95,136.—Grain Separator.—J. F. Plum, near Greencastle, Pa.
95,137.—Projectile.—A. F. Potter, San Francisco, Cal.
95,138.—Sash-Rope Pulley.—J. C. Price, New Philadelphia, Ohio.
95,139.—Corn Planter.—W. S. Purdey, Butler, Ind.
95,140.—Machine for Sawing Fellies.—Ezra Rhodes, Erie, Pa.
95,141.—Fly Brush.—H. R. Robbins, Baltimore, Md.
95,142.—Corn and Cotton Cultivator.—J. H. Robinson, Selma, Ala.
95,143.—Upset, Punch, and Shears.—J. B. Rose and J. B. Brown, New London, Wis.
95,144.—Upset, Punch, and Shears.—J. B. Rose and J. B. Brown, New London, Wis.
95,145.—Loom for Making Fringe.—George Roth (assignor to Heinemann and Silbermann), New York city.
95,146.—Shutter Hook.—D. C. Sage, Middletown, Conn.
95,147.—Horse Rake.—C. W. Sanborn, Morrill, Me.
95,148.—Sawing Machine.—J. G. Schiller, New Middletown, Ohio.
95,149.—Seed Feeding Device for Grain Drills, etc.—Andreas Schopp, Belleville, Ill.
95,150.—Propeller.—Christian Sharps, Philadelphia, Pa.
95,151.—Bee Hive.—E. N. Shedd, Three Oaks, Mich.
95,152.—Atomizer for Administering Medicines.—James Sheedy, New York city.
95,153.—Cylinder Paper Machine.—J. P. Sherwood, Fort Edward, N. Y. Antedated Sept. 10, 1869.
95,154.—Screw-Cutting Die Plate.—Tom Shrewsbury, New York city.
95,155.—Valve for Steam and other Enginery.—Gerard Sickles, Boston, Mass.
95,156.—Butter Jar.—John Smith, East Liverpool, Ohio. Antedated May 26, 1869.
95,157.—Lifting Jack.—L. P. Smith, Middletown, Pa.
95,158.—Butter Worker.—Otis Snow, Burlington, Vt.
95,159.—Pinch Bar.—Palmer Spalding, Chicago, Ill., assignor to himself, William Spalding, and T. D. Spalding.
95,160.—Playing Cards.—John Stevens, Mount Vernon, N. Y.
95,161.—Combined Oven and Drum.—J. J. Stout, S. J. Russell, and Noah Mendenhall, Greensburg, Ind.
95,162.—Rubber Compound.—M. A. Sutherland, New York city.
95,163.—Plow.—Abel Teague, Madisonville, Ky. Antedated September 10, 1869.
91,164.—Horse Rake.—P. A. Thayer, Theresa, N. Y.
95,165.—Mechanical Movement.—Hugh Thomas and Robert Wallace, New York city.
95,166.—Gage for Saws.—C. W. Tschumy, Fremont, Ohio.
95,167.—Churn.—S. S. Ulrey, North Manchester, Ind.
95,168.—Horse Power.—J. S. Upton, Battle Creek, Mich.
95,169.—Fruit Crate.—Frank R. Van Dake, Jackson, Miss.
95,170.—Cooking Stove.—N. S. Vedder, Troy, N. Y.
95,171.—Ruffling Attachment for Sewing Machines.—C. A. Vosburgh (assignor to himself and Merriam, Boyd, and Co.), Memphis, Tenn.
95,172.—Shoemakers' Tool.—Michael Walpole, Milford, Mass.
95,173.—Medical Compound.—John Ward, Evansville, Ind. Antedated Sept. 13, 1869.
95,174.—Eccentric.—J. C. Wells, Warren, Pa.
95,175.—Potato Digger.—James Wheeler, Dowagiac, Mich.
95,176.—Dumping Cart.—M. F. Wickersham, Springfield, Ill., assignor to himself, Thomas Eckhardt, H. F. Eldred, J. G. Law, T. Hutchinson, C. B. Hurd, C. Dresser, and D. Sherman.
95,177.—Street-Sweeping Machine.—M. F. Wickersham, Springfield, Ill., assignor to himself, Thomas Eckhardt, H. F. Eldred, J. G. Law, T. Hutchinson, C. B. Hurd, C. Dresser, and D. Sherman.
95,178.—Fence Post.—M. K. Butterfield, Eddyville, N. Y.

REISSUES.

85,578.—Cooking Stove.—Dated Feb. 2, 1869; reissue 3,642.—Clement Olhaber, Cincinnati, Ohio.
92,357.—Steam Water Elevator.—Dated July 6, 1869; reissue 3,643.—W. E. Prall, Washington, D. C., and A. C. Rand, New York city, assignees of W. E. Prall.
42,118.—Grate.—Dated March 29, 1864; reissue 3,644.—G. L. Smith, Brooklyn, N. Y.
70,943.—Steam Engine.—Dated November 19, 1867; reissue 3,645.—Jules Strehler, New York city, assignee of Eugene Bourson.
92,840.—Rotary Oven.—Dated July 20, 1869; reissue 3,646.—D. A. Kennedy, William Wadsworth, and E. D. Murray, Darien, Wis., assignees of D. A. Kennedy.

DESIGNS.

3,664 to 3,666.—Hinge.—Milton Bradley, Springfield, Mass., assignor to the Union Manufacturing Company, New Britain, Conn. Three patents.

EXTENSIONS.

Knitting Machine.—Clark Tompkins, of Troy, N. Y. and John Johnson, of Boston, Mass.—Letters Patent No. 13,586, dated Sept. 18, 1855; reissue No. 963, dated May 15, 1860.

Machinery for Folding and Measuring Cloth.—J. D. Elliot of Leicester, Mass.—Letters Patent No. 13,543, dated September 11, 1855.

Steam Gage Cocks.—Albert Bisbee, of Chelsea, Mass.—Letters Patent No. 13 563, dated September 18, 1855.

Door Locks.—J. H. Butterworth, of Dover, N. J.—Letters Patent No. 4,452, dated April 11, 1846; reissue No. 88, dated June 4, 1861.

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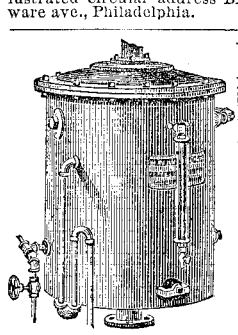

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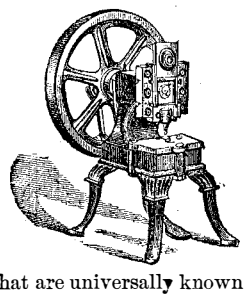

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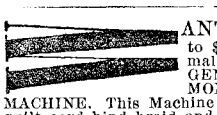

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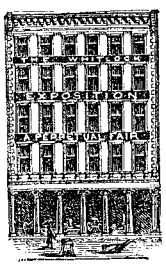

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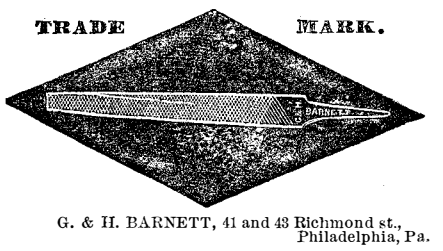

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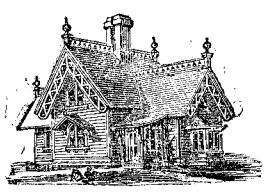

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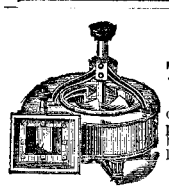

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